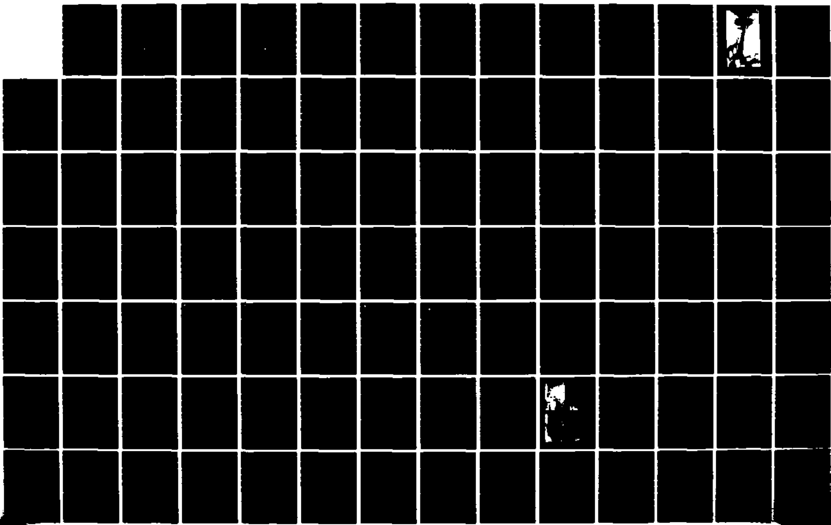
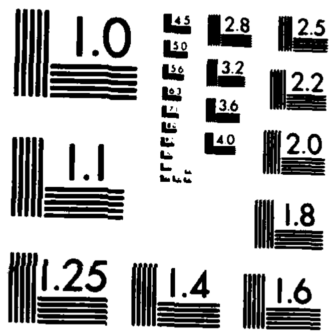
AD-A142 760 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS EUREKA LAKE DAM (CT 0..(U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV AUG 79 1/2

UNCLASSIFIED F/G 13/13 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD-A142 760

HOUSATONIC RIVER BASIN

DANBURY, CONNECTICUT

EUREKA LAKE DAM
CT 00077

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST, 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00077	2. GOVT ACCESSION NO. AD-A142760	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Housatonic River Basin Danbury, Conn., Eureka Lake Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE August 1979 13. NUMBER OF PAGES 90
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Housatonic River Basin
Danbury, Conn.
Eureka Lake Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The project consists of two earthfill embankments, a spillway with two masonry weirs, and a masonry gatehouse. The upper embankment forms the reservoir dam, and the lower embankment which is 140± ft. downstream, forms a filter basin between the two dams. The reservoir dam is 18 ft. high, 10 ft. wide at the crest and 250 ft. long and the filter basin dam is 20 ft. high, 280 ft. long and 6 ft. wide at the crest. The reservoir dam has riprap on both slopes wheras the filter basin dam has riprap on the upstream slope and a grass cover on the downstream slope.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

HOUSATONIC RIVER BASIN

DANBURY, CONNECTICUT

EUREKA LAKE DAM
CT 00077

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

AUGUST, 1979

BRIEF ASSESSMENT

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

Name of Dam:	EUREKA LAKE DAM
Inventory Number:	00077
State Located:	CONNECTICUT
County Located:	FAIRFIELD
Town Located:	DANBURY
Stream:	TRIBUTARY SYMPAUG BROOK
Owner:	TOWN OF BETHEL
Date of Inspection:	MAY 4 and JULY 20, 1979
Inspection Team:	PETER M. HEYNEN, P.E.
	MIRON PETROVSKY
	GEORGE STEPHENS

The project consists of two earthfill embankments, a spillway with two masonry weirs, and a masonry gatehouse. The upper embankment forms the reservoir dam, and the lower embankment which is 140± feet downstream, forms a filter basin between the two dams. The reservoir dam is 18 feet high, 10 feet wide at the crest and 250 feet long and the filter basin dam is 20 feet high, 280 feet long and 6 feet wide at the crest. The reservoir dam has riprap on both slopes whereas the filter basin dam has riprap on the upstream slope and a grass cover on the downstream slope. The spillway extends along the left side of both dams, is 8± feet wide and has an upper spillway weir adjacent to the reservoir dam and a lower weir adjacent to the filter basin dam. The two weirs are basically stone masonry with concrete sills and are very similar in construction. The spillway channel between the two weirs is separated from the filter basin by a stone masonry retaining wall. The stone gatehouse is located on the downstream slope of the filter basin dam. The outlets are a 12 inch low level outlet and a 6 inch gatehouse floor drain pipe. The low level outlet valve is operable.

Based upon the visual inspection at the site and past performance of the dam, the dam is judged to be in fair condition. No evidence of instability of the embankments or appurtenant structures was observed. There are some areas requiring attention, maintenance and monitoring, such as seepage on the downstream slope and toe of the filter basin dam, substantial erosion on the downstream slope of the filter basin dam near the outlet pipes and excessive seepage from the gatehouse drain pipe. Deterioration of the spillway training wall and lower spillway weir, and obstructions in the spillway channel were noted.

In accordance with Corps of Engineers Guidelines for the size (Small) and hazard (High) classification, the test flood will be equivalent to the Probable Maximum Flood (PMF). Peak inflow to the reservoir is 1200 cfs; peak outflow is 1020 cfs with the reservoir dam overtopped 1.1 feet and the filter basin dam overtopped 0.8 feet. The upper spillway capacity is 29 cubic feet per second (cfs) and the lower spillway capacity is 66 cfs, which is equivalent to 3% and 6% of the routed test flood outflow, respectively.

It is recommended that the owner retain the services of a registered professional engineer to perform a more detailed hydraulic/hydrologic analysis to determine the adequacy of the project discharge. Recommendations should then be made by the engineer and implemented by the owner. Attention should also be focused on seepage problems and erosion on the downstream slope of the filter basin dam, extension of the downstream outlets and rehabilitation of the spillway and the spillway channel.

The above recommendations and any further remedial measures which are discussed in Section 7, should be instituted within one (1) year of the owner's receipt of this report.

Peter M. Heynen, P.E.
Project Manager
Cahn Engineers, Inc.

STATE OF CONNECTICUT
PETER M. HEYNEN
NO. 9618
REGISTERED
PROFESSIONAL ENGINEER

Edgar B. Vinal, Jr., P.E.
Senior Vice President
Cahn Engineers, Inc.

STATE OF CONNECTICUT
PROFESSIONAL ENGINEER

Accession For
NTIS X
DTIC
Dist
A-1

This Phase I Inspection Report on Eureka Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

____

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

____

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

____

SAUL C. COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

____

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

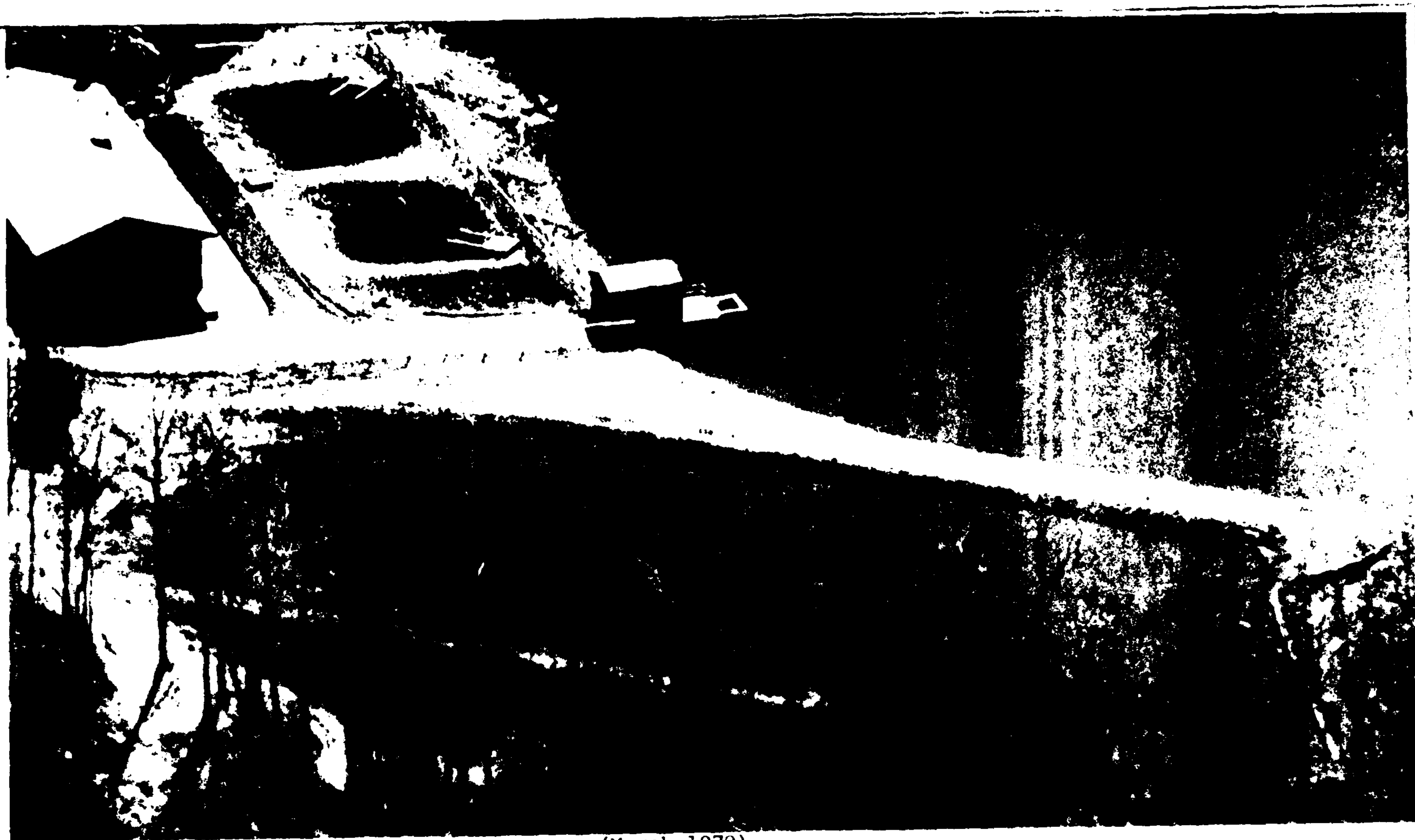
In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam would necessarily represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as neccessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

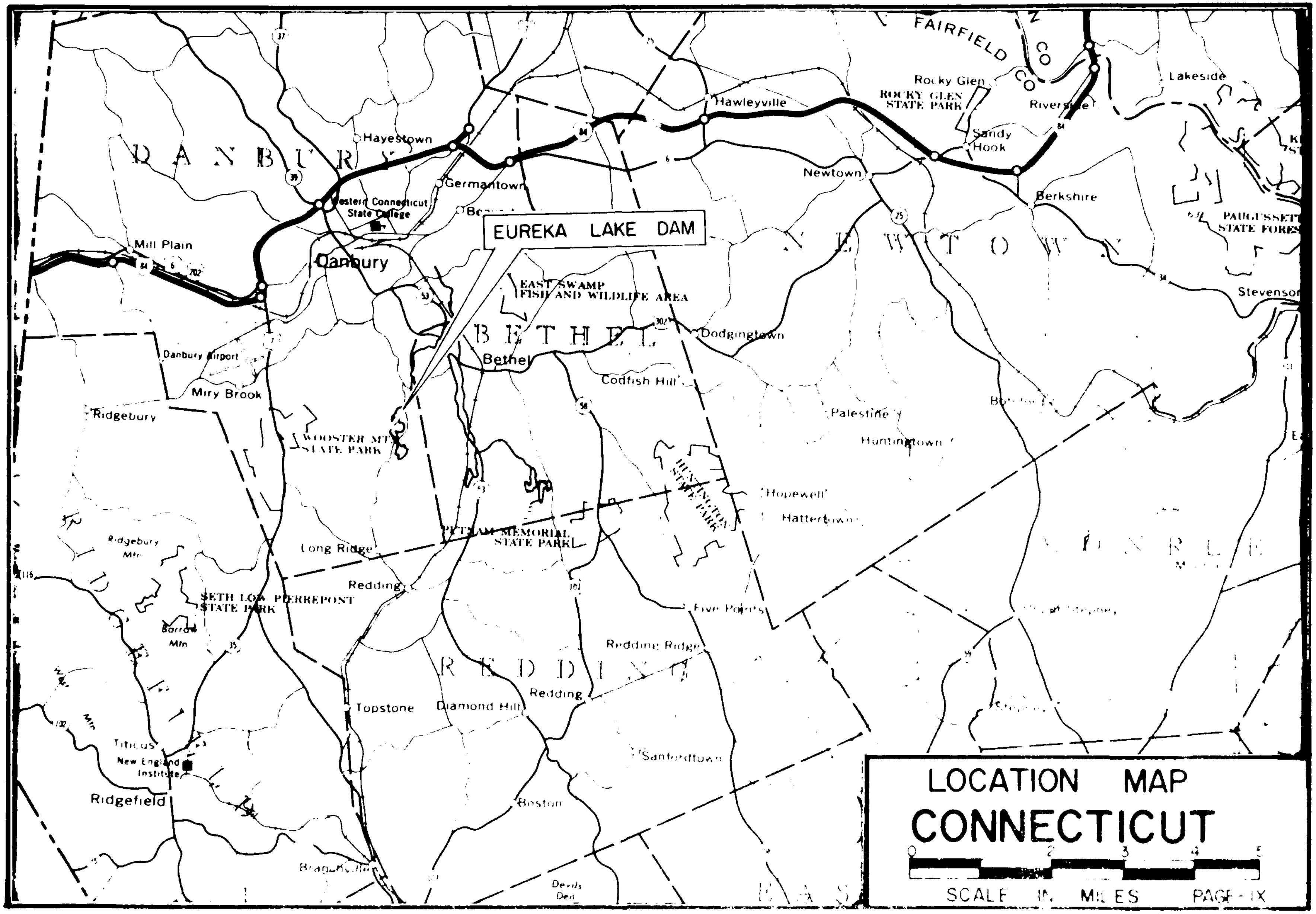
TABLE OF CONTENTS

APPENDICES



(March 1979)

US ARMY ENGINEER DIV NEW ENGLAND [illegible]PS OF ENGINEERS NA[illegible]THAM, MASS	NATIONAL PROGRAM OF INSPECTION OF NON[illegible]D DAMS	EUREKA LAKE DAM TR-SYMPAUG BROOK	DAN[illegible]	DAT[illegible]
[illegible] ENGINEERS IN[illegible]				



EUREKA LAKE DAM
LOCATION MAP
CONNECTICUT
SCALE IN MILES
FAIRFIELD CO
Danbury
Bethel
Hayestown
Germantown
Western Connecticut State College
Mill Plain
Danbury Airport
Miry Brook
Ridgebury
WOOSTER MTN STATE PARK
EAST SWAMP FISH AND WILDLIFE AREA
Dodgingtown
Codfish Hill
Hawleyville
Newtown
Rocky Glen
ROCKY GLEN STATE PARK
Sandy Hook
Riverside
Lakeside
Berkshire
Stevenson
Palestine
Huntingtown
Hopewell
Hattertown
HUNTINGTON STATE PARK
PUTNAM MEMORIAL STATE PARK
Long Ridge
Redding
SETH LOW PIERREPONT STATE PARK
Ridgebury Mtn
Barrow Mtn
Five Points
Redding Ridge
Topstone
Diamond Hill
Sanfordtown
Boston
Titicus
New England Institute
Ridgefield
Branchville
Devils Den

PAGE-IX

PHASE I INSPECTION REPORT

EUREKA LAKE DAM

SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority - Public Law 92-367, August 8 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Cahn Engineers, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Cahn Engineers, Inc. under a letter of March 30, 1979 from John P. Chandler Colonel, Corps of Engineers. Contract No. 33-79-C-0059 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interests.

2. Encourage and prepare the States to guickly initiate effective dam inspection programs for non-federal dam.

3. To update, verify and complete the National Inventory of Dams

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.

1.2 DESCRIPTION OF PROJECT

a. Location - The project is located on a tributary of Sympaug Brook in a rural area of the town of Danbury, County of Fairfield, State of Connecticut. The dams are shown on the Bethel USGS Quandrangle Map having coordinates latitude N $41^{\circ}21.8'$ and longitude W $73^{\circ}26.3'$.

b. Description of Dams and Appurtenances - The project consists of two earthfill embankments. The upper dam retains the reservoir, and the lower dam which is 140± feet downstream, forms a filter basin between the two dams. A spillway with two concrete weirs is located to the left end of both embankments.

The reservoir dam is 18± feet high, 250± feet long and 10± feet wide at the crest. The filter basin dam is 20± feet high, 280± feet long and 6± feet wide at the crest. The upstream and downstream slope inclinations for both embankments are approximately 2 horizontal to 1 vertical. Both slopes of the reservoir dam and the upstream slope of the filter basin dam are riprapped. A stone retaining wall with concrete facing is located around the perimeter of the sand filter in the filter basin. This wall is incorporated into the downstream slope of the reservoir dam and the upstream slope of the filter basin dam.

The spillway is 8± feet long and consists of an upper weir at the reservoir dam, a lower weir at the filter basin dam and a 150± foot spillway channel between the two weirs. The spillway weirs are similiar in construction, with masonry training walls, a 3 foot wide concrete sill and slots for stop-planks. Only the upper spillway weir has stop-planks installed which are 0.6 feet high. Freeboard between the top of the upper spillway stop-planks and the top of the reservoir dam is 1.2± feet; freeboard from the top of the lower weir concrete sill to the top of the filter basin dam is 2.1± feet. The masonry spillway training wall, located on the right side of the spillway, extends the length of the spillway channel and separates the spillway channel and the filter basin.

The gatehouse, on the right side of the downstream slope of the filter basin dam, is a stone masonry structure. A 12 inch tile low-level outlet and a 6 inch steel drain pipe outlet are located 25± feet downstream of the gatehouse and 22± feet below the top of the filter basin dam. The low level outlet extends beneath both embankments and the filter basin, serves as a drawdown for the reservoir and is controlled by a valve located at the gatehouse. The 12 inch gate valve is operable.

c. Size Classification - SMALL - The dam impounds 250 acre-feet of water with the reservoir level at the top of the filter basin dam which at elevation 549.8, is 20 feet above the outside limits of the downstream slope. According to the Recommended Guidelines the dam is classified as small in size.

d. Hazard Classification - HIGH - If the dam was to be breached, there is potential for loss of life and extensive property damage at a small housing project located approximately 1800 feet downstream at Reservoir Street.

e. Ownership - Town of Bethel
Town Hall
Library Place
Bethel, CT
First Selectman
(203) 743-9231

f. Operator - Mr. Larry Straiton, (203) 748-4411

g. Purpose - Water Supply

h. Design and Construction History - The following information is believed to be accurate based on the plans and correspondence available. The reservoir embankment was constructed by D.A. chappell, Contractor, Chicago, in 1878. The filter basin and lower dam were designed and constructed by William B. Ryder & Son, Engineers and Contractors in 1892. In 1976 a new water treatment plant was designed by Cahn Engineers, Inc., Wallingford, Connecticut, and construction was completed in 1978. During the plant construction, the upper gatehouse on the upstream slope of the reservoir dam was removed and the use of the filter basin was discontinued.

i. Normal Operational Procedures - The water level in the reservoir is normally maintained at the upper spillway crest, elevation 548.3. The valve for the low level outlet is normally kept in a closed position. A raw water intake with a trashrack at elevation 533.0 is located at the right end of the dam. This inlet is used for water supply to the filter plant but does not control the water level in the reservoir.

1.3 PERTINENT DATA

a. Drainage Area - 0.48 square miles of moderately steep, relatively undeveloped, wooded terrain.

b. Discharge at Damsite - Discharge is from over the spillway and through the 12inch low-level outlet located at the downstream slope of the filter basin embankment.

1. Outlet Works (conduits):	12inch low level outlet @ Invert El. 527.3±
2. Maximum known flood @ damsite:	N/A
3. Lower spillway capacity @ top of filter basin dam el. 549.8:	66 cfs.
Upper Spillway Capacity @ top of reservoir dam el. 549.5:	29 cfs.
4. Lower spillway capacity @ test flood el. 550.6:	110 cfs.
Upper Spillway capacity @ test flood el 550.6:	76 cfs.
5. Gated spillway capacity @ normal pool el.:	N/A
6. Gated spillway capacity @ test flood el.:	N/A
7. Total spillway capacity @ test flood el.:	N/A
8. Total project discharge @ test flood el. 550.6:	1020 cfs.

c. Elevations (Feet Above Mean Sea Level)

1. Streambed @ centerline of dam:	N/A
2. Maximum tailwater:	N/A
3. Upstream portal invert diversion tunnel:	N/A
4. Recreation pool:	N/A
5. Full flood control pool:	N/A
6. Spillway crest (ungated):	Upper Weir - 548.3± Lower Weir - 547.7±
7. Design surcharge (original design):	N/A
8. Top of dam:	Reservoir dam - 549.5± Filter basin dam - 549.8±

9. Test flood design surcharge: N/A

d. Reservoir

1. Length of maximum pool: 2300± ft.
2. Length of recreation pool: N/A
3. Length of flood control pool: N/A

e. Storage

1. Recreation pool: N/A
2. Flood control pool: N/A
3. Spillway crest pool: 210± acre-ft.
4. Top of dam: 250± acre-ft.
5. Test flood Pool: 280± acre-ft.

f. Reservoir Surface

1. Recreation pool: N/A
2. Flood control pool: N/A
3. Spillway crest: 26± acres
4. Top of dam: 31± acres
5. Test flood pool: 33± acres

g. Dams

1. Type: Earthfill embankments
2. Length: Reservoir dam 250 ft.
Filter basin dam 280 ft.
3. Height: Reservoir dam 18 ft.
Filter basin dam 20 ft.
4. Top width: Reservoir dam 10 ft.
Filter basin dam 6 ft.
5. Side slopes: 2±H to 1±V Upstream
2±H to 1±V Downstream
6. Zoning: N/A

7. Impervious core:	Unknown
8. Cutoff:	N/A
9. Grout curtain:	N/A
10. Other:	N/A

h. <u>Diversion and Regulatory Tunnel</u> - N/A

i. <u>Spillway</u>

1. Type:	Concrete sill
2. Length of weir:	Upper 8.0 ft. Lower 7.8 ft.
3. Crest elevation:	Upper 548.3 (0.6' stopplanks) Lower 547.7
4. Gates:	N/A
5. Upstream Channel:	Natural reservoir bottom
6. Downstream Channel:	Rock
7. General:	Right side of spillway is 150' long masonry training wall

j. <u>Regulating Outlets</u> - Low-Level outlet at the downstream slope of the filter basin embankment.

1. Invert:	427.3±
2. Size:	12"
3. Description:	Tile
4. Control Mechanism:	Hand operated floor stand
5. Other:	N/A

SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Available Data - The available data consists of drawings by the Bethel Water Company, "Report on Water Works" by Thomas M. Riddick, Consulting Engineer and an inspection report by Clarence Blair Associates. Also, there is an inspection report dated July 1975, drawings titled "Eureka Water Treatment Plant" and correspondence concerning these drawings, from Cahn Engineers, Inc.

b. Design Features - The drawings and correspondence indicate the design features stated in Section 1.

c. Design Data - There were no engineering values, assumptions, test results or calculations available for the original construction.

2.2 CONSTRUCTION

a. Available Data - There were no as-built drawings or inspection records available for the construction.

b. Construction Consideration - No information was available.

2.3 OPERATIONS

Lake level readings are taken daily. It is reported that the dam spillway capacity has never been exceeded. No formal operation records are known to exist.

2.4 EVALUATION

a. Availability - Existing data was provided by the Town of Bethel, Cahn Engineers, Inc. and the State of Connecticut Department of Environmental Protection. The owner made the operations available for visual inspection.

b. Adequacy - The limited amount of detailed engineering data available was generally inadequate to perform an in-depth assessment of the dam, therefore, the final assessment of this dam must be based primarily on visual inspection, performance history, test borings, hydraulic computations of spillway capacity and approximate hydrologic judgements.

c. Validity - A comparison of records, data and visual observation reveals no significant discrepancies in the record data.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General - The general condition of the dam is fair. Inspection did reveal some areas requiring maintenance and monitoring. The reservoir level was 549.0± (May 4, 1979) and 546.5± (July 20, 1979) and the filter Basin was filled at the time of our inspections.

b. Dam - The dam consists of two earthfill embankments located 140± feet apart and forming a filter basin. A spillway is located adjacent to the left end of both embankments.

Reservoir Dam

Crest - The crest of the dam has a grass and weed cover. No misalignment, visible depressions or cracks were observed (Photo 1).

Upstream Slope - The slope protection is hand-placed riprap which did not have any visible displacements or areas needing replacement, although there is some vegetation between the stones (Photo 1).

Downstream Slope - The downstream slope inclination and protection is similar to the upstream slope. At the toe of the slope is a 2 foot thick masonry wall which forms the boundary for the sand filter. The downstream slope appeared to be in good condition (Photo 2).

Filter Basin Dam - The dam lies approximately 140 feet downstream of the reservoir dam.

Crest - The crest of the dam was covered with tall grass and weeds. No misalignment, visible settlement or cracks were observed (Photo 3).

Upstream Slope - The upstream slope is similar to the downstream slope of the reservoir dam. The riprap was in good condition, with no sloughing or erosion. Some weeds were noted on the slope (Photo 4).

Downstream Slope - The downstream slope is covered with grass and weeds.

Heavy Brush and trees up to 12 inches in diameter were observed on the slope and the toe of the dam (Photo 5). The lower portion and the toe of the dam were wet and swampy. Several seeps were discovered on the downstream slope. One of the seeps was located approximately 5 to 6 feet from the top of the dam and others were situated at the central portion of the dam 10 to 12 feet from the crest. The seepage flow was varied for each

seep, but was estimated at 0.5 to 3 gallons per minute with a total discharge of 5 to 6 gal./min. Considerable erosion was identified on the downstream slope near the center of the dam. This erosion is caused by discharge from the low level and gatehouse floor drain outlets, and was 6± feet in depth and 10± feet in width. Steady flow from the outlets saturates the downstream slope and toe, causing the swampy situation existing in this area.

Spillway - The upper spillway weir had no visible cracks or deteriorations. However, obstructions, such as a small brush and boulders, were observed in the channel between the two weirs. (Photo 7). The right training wall running along the length of this channel had cracks of up to 2 inches in size and deteriorating areas with wash-outs at the bottom of the wall (Photo 8). The sill of the lower weir was almost completely broken up with the right portion washed out (Photo 9). The floor of the downstream spillway channel was covered with rocks and boulders and heavily overgrown (Photo 10). Stop-planks, 0.6 feet high were installed at the upper wier but no stop-planks were installed at the lower weir.

c. Appurtenant Structures - The gatehouse on the downstream slope of the filter basin dam is in good condition (Photo 11). The 12 inch low level outlet pipe and 6 inch gatehouse floor drain had no outlet structure, leaving the area around these pipes exposed to erosion from outlet discharge. The flow from the 6 inch gatehouse floor drain seemed excessive for drainage from the gatehouse only and was measured at 18 to 20 gallons per minute (Photo 12). Flow into the filter basin is from seepage and overflow at the spillway retaining wall, precipitation and possible seepage through the reservoir embankment.

d. Reservoir Area - The shoreline surrounding the pond is heavily wooded and largely undeveloped.

e. Downstream Channel - The downstream channel is undeveloped, steep-sided and wooded to the initial impact area.

3.2 EVALUATION

Based upon the visual inspection, the dam was assessed as being generally in fair condition. The following features which could influence the future condition and/or stability of the dam were identified.

1. Heavy grass, brush and trees on the downstream slope of the filter basin dam impede dam monitoring, accumulate moisture in the dam body which increases seepage and could cause damage if trees overturn during strong winds and/or hurricane conditions.

2. Although, at the present time the seepage through the filter basin dam appears to be stable, it could increase and jeopardize the safety of the embankment.

3. The steady flow from the 6 inch gatehouse floor drain pipe outlet indicates seepage through the filter basin dam. This flow is causing considerable erosion on the downstream slope and saturation of the slope and toe of the filter basin dam. This could result in deformation of the outlet pipe and sloughing of the downstream slope.

4. Obstructions in the spillway channel and the installation of stop-planks in the upper weir decrease the capacity of the spillway, increasing the potential for overtopping of the project.

SECTION 4: OPERATIONAL PROCEDURES

4.1 REGULATING PROCEDURES

The reservoir level readings are taken daily. There is no formal operation procedure known to exist. The low level outlet is operated only to regulate the water level in the reservoir.

4.2 MAINTENANCE OF DAM

The operator reported the grass is cut and brush removed every year on the crest of the reservoir embankment and the right abutment.

4.3 MAINTENANCE OF OPERATING FACILITIES

Maintenance consists of greasing the floor stand and opening the low level outlet valve to regulate the reservoir water level.

4.4 DESCRIPTION OF ANY FORMAL WARNING SYSTEM IN EFFECT

No formal warning system is in effect.

4.5 EVALUATION

The operation and maintenance procedures are generally fair with areas requiring improvement. A formal program of operation and maintenance should be implemented, including documentation to provide complete records for future reference. Also, a formal warning system should be developed and implemented within the time frame indicated in Section 7.1c. Remedial operation and maintenance recommendations are presented in Section 7.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. General - The dam is basically a low surcharge storage - high spillage earth embankment. There are two embankments 140+ feet apart which form a filter basin between them. There are also two weirs in the spillway, one located at each dam. The lower dam, or filter basin dam, is slightly higher than the reservoir dam.

b. Design Data - No computations could be found for the original dam construction or subsequent addition of the filter basin dam.

c. Experience Data - No information on serious problem situations arising at the dam was found, and it was reported that the dam has not been overtopped.

d. Visual Observations - There was brush and several boulders in the spillway channel between the two weirs and debris piled up just below the lower spillway weir.

e. Test Flood Analysis - The test flood for this high hazard, small size dam is equivalent to the Probable Maximum Flood (PMF) of 1200 cubic feet per second (cfs). Based upon "Preliminary Guidance for Estimating Maximum Probable Discharge", dated March 1978, peak inflow to the reservoir is equal to the PMF (Appendix D-1); peak outflow is 1020 cfs with the upper dam overtopped 1.2 feet (Appendix D-4). Based upon our hydraulics computations, the lower spillway capacity is 66 cfs and the upper spillway capacity is 29 cfs, which is approximately 6% and 3% respectively, of the routed Test Flood outflow at the top of the lower dam.

f. Dam Failure Analysis - The dam failure analysis is based on the April, 1978 "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs" and the following:

1) The filter basin is no longer in use and the water level in this basin is normally maintained at or near the reservoir level, which will result in a higher hydrostatic head at the filter basin dam than at the reservoir dam.

2) The reservoir dam will be overtopped with the test flood to the top of the filter basin dam.

Considering the larger difference in head at the filter basin dam and the similarity in construction of the two dams, it is assumed that the filter basin dam will fail before the reservoir dam. Then, with the sudden drawdown of the water in the filter basin and the resulting increase in head at the reservoir dam, failure will probably occur at the reservoir dam

very soon after failure of the filter basin dam. Due to the insignificant amount of storage released to the initial impact area at failure of of the filter basin dam, the reservoir dam will be used for failure analysis of this project. Based on the above considerations, the peak failure outflow from the reservoir dam breaching would be 7,700 cubic feet per second. A breach of this dam would result in a rise of 7.1 feet in the water level of the stream at the initial impact area, which corresponds to an increase in the water level from a depth of 1.0 feet just before the breach, to a depth of 8.1 feet just after the breach. The rapid 7.1 foot increase in the water level at the initial impact area would endanger at least 2 houses approximately 1800 feet downstream at Reservoir Street. Also, approximately 1 mile downstream from the dam is the town of Bethel. In this area, there is a good possibility that the increased water level in Sympaug Brook will cause flooding at residences located near the streambed.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - The visual inspections did not reveal any indications of stability problems. There are areas of seepage and considerable erosion on the downstream slope of the filter basin embankment. Substantial obstructions in the spillway channel were observed.

b. Design and Construction Data - There is not enough design and construction data available to permit an in-depth assessment of the structural stability of the dam.

c. Operating Records - The operating records available do not include any indications of dam instability since its construction in 1878.

d. Post Construction Changes - Post construction changes include placement of a new sand filter on the bottom of the filter basin in 1960 and removal of the gatehouse at the reservoir dam in 1977 during construction of the water treatment plant.

e. Seismic Stability - The dam is in Seismic Zone 1 and according to the Recommended guidelines need not be evaluated for Seismic Stability.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition - Based upon the visual inspection of the site and its past performance, the dam appears to be in fair condition. No evidence of structural instability was observed in the dam or its appurtenances. The filter basin embankment is generally in fair condition with seepage, wet areas and considerable erosion on the downstream slope. Other areas of concern include deterioration of the lower concrete spillway weir, deterioration of the spillway channel right training wall, obstructions on the spillway channel floor, the spillway capacity and the lack of scheduled and continuous maintenance.

Based upon "Preliminary Guidance for Estimating Maximum Probable Discharge" dated March, 1978, peak inflow to the reservoir is 1200 cubic feet per second; peak outflow (Test Flood) is 1020 cubic feet per second with the dam overtopped. Based upon our hydraulics computations, the upper and lower spillway capacities are 29 and 66 cubic feet per second, which are equivalent to approximately 3% and 6% of the routed Test Flood outflow, respectively.

b. Adequacy of Information - The information available is such that an assessment of the condition and stability of the dam must be based solely on visual inspection, past performance of the dam, and sound engineering judgement.

c. Urgency - It is recommended that the measures presented in Section 7.2 and 7.3 be implemented with in one year, respectively, of the owner's receipt of this report.

d. Need for Additional Information - There is a need for more information as recommended in Section 7.2.

7.2 RECOMMENDATIONS

It is recommended that further studies by made by a registered professional engineer qualified in dam design and inspection pertaining to the following:

1. A detailed hydraulic/hydrologic analysis should be performed to determine the adequacy of the project discharge. Recommendations should be made by the engineer and implemented by the owner.

2. A comprehensive inspection of the dam. Items of particular importance are as follows:

    a. Evaluation of the reservoir dam embankment when the reservoir level is high and the filter basin is empty.

b. Evaluation of the filter basin embankment when the basin is full. Origin and significance of seepage on the downstream slope of the filter basin dam and through the 6 inch gatehouse floor drain pipe. Instrumentation of the embankment is desirable including installation of piezometers and seepage flow metering devices.

c. Filling of the large erosion area on the downstream slope of the filter basin dam and extension of the low level and drain pipe outlets past the limits of the embankment slope so as to eliminate future erosion.

d. Removal of the large trees from the downstream slope and toe of the filter basin embankment and filling of the resulting holes under supervision of the engineer.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures - The following measures should be undertaken within the time frame indicated in Section 7.1.c, and continued on a regular basis.

1. Round-the-clock surveillance should be provided by the owner during periods of unusually heavy precipitation or high project discharge. The owner should develop a downstream warning system in case of emergencies at the dam.

2. A formal program of operation and maintenance procedures should be instituted and fully documented to provide accurate records for future reference.

3. A comprehensive program of inspection by a registered, professional engineer qualified in dam inspection should be instituted on an annual basis.

4. Erosion area on the downstream slope of the filter basin embankment should be filled and slope protection placed.

5. Outlets for the 12 inch low level and 6 inch drain pipe should be extended out from the toe of the filter basin dam and an outlet structure installed for pipe support.

6. Seepage at the left end and central portion of the downstream slope of the filter basin dam as well as seepage from the 6 inch gatehouse drain pipe should be monitored periodically for measurement of flow rate. The wet area at the downstream toe should be delineated to insure that it does not expand toward the downstream slope.

7. Brush and small trees on the crest, downstream slope and toe of the filter basin embankment should be removed. The cutting of grass on these areas of the dam should be continued as part of the routine dam maintenance.

8. Concrete of the lower spillway weir should be repaired.

9. Right spillway training wall, having numerous cracks and small wash-outs, should be repaired.

10. All obstructions in the bottom and on the slopes of the spillway channel,including rocks, boulders, brush and trees should be removed.

7.4 ALTERNATIVES

This study has identified no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Eureka Lake Dam

DATE: May 4 and July 20, 1979

TIME: 2:30 - 4:30 P.M.

WEATHER: 75 - 85 °F, sunny

W.S. ELEV. 549.0± (May 4) U.S.

546.5± (July 20) U.S.

PARTY:	INITIALS:	DISCIPLINE:
1. Peter M. Heynen	PMH	Cahn Engineers, Inc
2. Miron Petrovsky	MP	Cahn Engineers, Inc
3. George Stephens	GS	Cahn Engineers, Inc
4. Larry Straiton	(Owner Representative)	Town of Bethel
5.		
6.		

PROJECT FEATURE	INSPECTED BY	REMARKS
1. Reservoir Embankment	PMH, MP, GS	
2. Filter Basin Embankment	PMH, MP, GS	
3. Gatehouse	PMH, MP, GS	
4. Outlet Structure	PMH, MP, GS	
5. Spillway and Spillway Channel	PMH, MP, GS	
6.		
7.		
8.		
9.		
10.		
11.		
12.		

PERIODIC INSPECTION CHECK LIST

Page A-2

PROJECT Eureka Lake Dam

DATE 5/4/79 and 7/20/79

PROJECT FEATURE Reservoir Dam

BY PMH, MP, GS

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	549.5±
Current Pool Elevation	549.0± (5/4/79) and 546.5± (7/20/79)
Maximum Impoundment to Date	unknown
Surface Cracks	none observed
Pavement Condition	N/A
Movement or Settlement of Crest	none observed
Lateral Movement	
Vertical Alignment	appears good
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	none observed
Trespassing on Slopes	none
Sloughing or Erosion of Slopes or Abutments	none observed
Rock Slope Protection-Riprap Failures	
Unusual Movement or Cracking at or Near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	N/A
Toe Drains	
Instrumentation System	

PERIODIC INSPECTION CHECK LIST

PROJECT Eureka Lake Dam DATE 5/4/79 and 7/20/79

PROJECT FEATURE Filter Basin Dam BY PMH, MP, GS

AREA EVALUATED		CONDITION
DAM EMBANKMENT		
Crest Elevation		549.8±
Current Pool Elevation		549.5± (5/4/79) and 549.5± (7/20/79)
Maximum Impoundment to Date		unknown
Surface Cracks		none observed
Pavement Condition		N/A
Movement or Settlement of Crest		none observed
Lateral Movement		
Vertical Alignment		appears good
Horizontal Alignment		
Condition at Abutment and at Concrete Structures		
Indications of Movement of Structural Items on Slopes		none observed
Trespassing on Slopes		
Sloughing or Erosion of Slopes or Abutments		D/S slope erosion at outlets
Rock Slope Protection-Riprap Failures		u/s slope riprap, appears good
Unusual Movement or Cracking at or Near Toes		none observed
Unusual Embankment or Downstream Seepage		seepage on left side and central portion of D/S slope, wet area at toe
Piping or Boils		none observed
Foundation Drainage Features		none observed
Toe Drains		
Instrumentation System		

PERIODIC INSPECTION CHECK LIST

PROJECT Eureka Lake Dam DATE 5/4/79 and 7/20/79

PROJECT FEATURE Gate House BY PMH, MP, GS

AREA EVALUATED	CONDITION
OUTLET WORKS-CONTROL TOWER	Stone masonry structure on d/s slope of filter basin dam
a) Concrete and Structural	
General Condition	appears good
Condition of Joints	N/A
Spalling	None observed
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflorescence	None observed
Joint Alignment	Appears good
Unusual Seepage or Leaks in Gate Chamber	Some
Cracks	Not observed
Rusting or Corrosion of Steel	Not observed
b) Mechanical and Electrical	
Air Vents	N/A
Float Wells	N/A
Crane Hoist	N/A
Elevator	N/A
Hydraulic System	N/A
Service Gates	12" gate valve, operable
Emergency Gates	N/A
Lightning Protection System	N/A
Emergency Power System	N/A
Wiring and Lighting System	N/A

PERIODIC INSPECTION CHECK LIST

Page A-5

PROJECT Eureka Lake Dam

DATE 5/4/79 and 7/20/79

PROJECT FEATURE Outlet Structure

BY PMH, MP, GS

AREA EVALUATED		CONDITION
OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL		12" low level outlet and 6" drain pipe on d/s slope of filter basin dam
General Condition of Concrete		N/A
Rust or Staining		N/A
Spalling		N/A
Erosion or Cavitation		10' x 6' x 4' erosion at pipe outlets
Visible Reinforcing		N/A
Any Seepage or Efflorescence		none observed
Condition at Joints		N/A
Drain Holes		N/A
Channel		
Loose Rock or Trees Overhanging Channel		none observed
Condition of Discharge Channel		Erosion of d/s slope and toe of filter basin dam

PERIODIC INSPECTION CHECK LIST

Page A-6

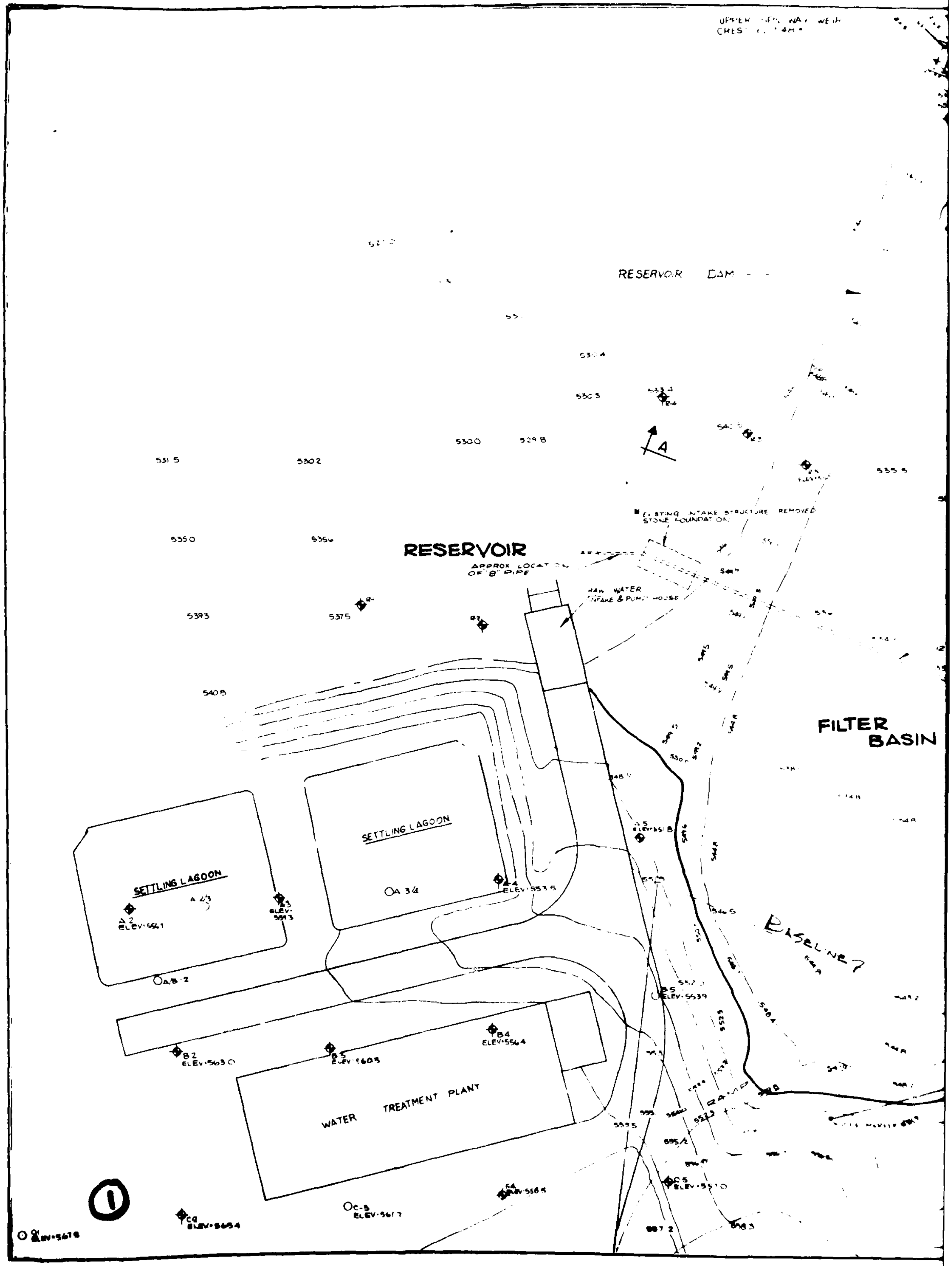
PROJECT Eureka Lake Dam DATE 5/4/79 and 7/20/79

PROJECT FEATURE Spillway and spillway Channel BY PMH, MP, GS

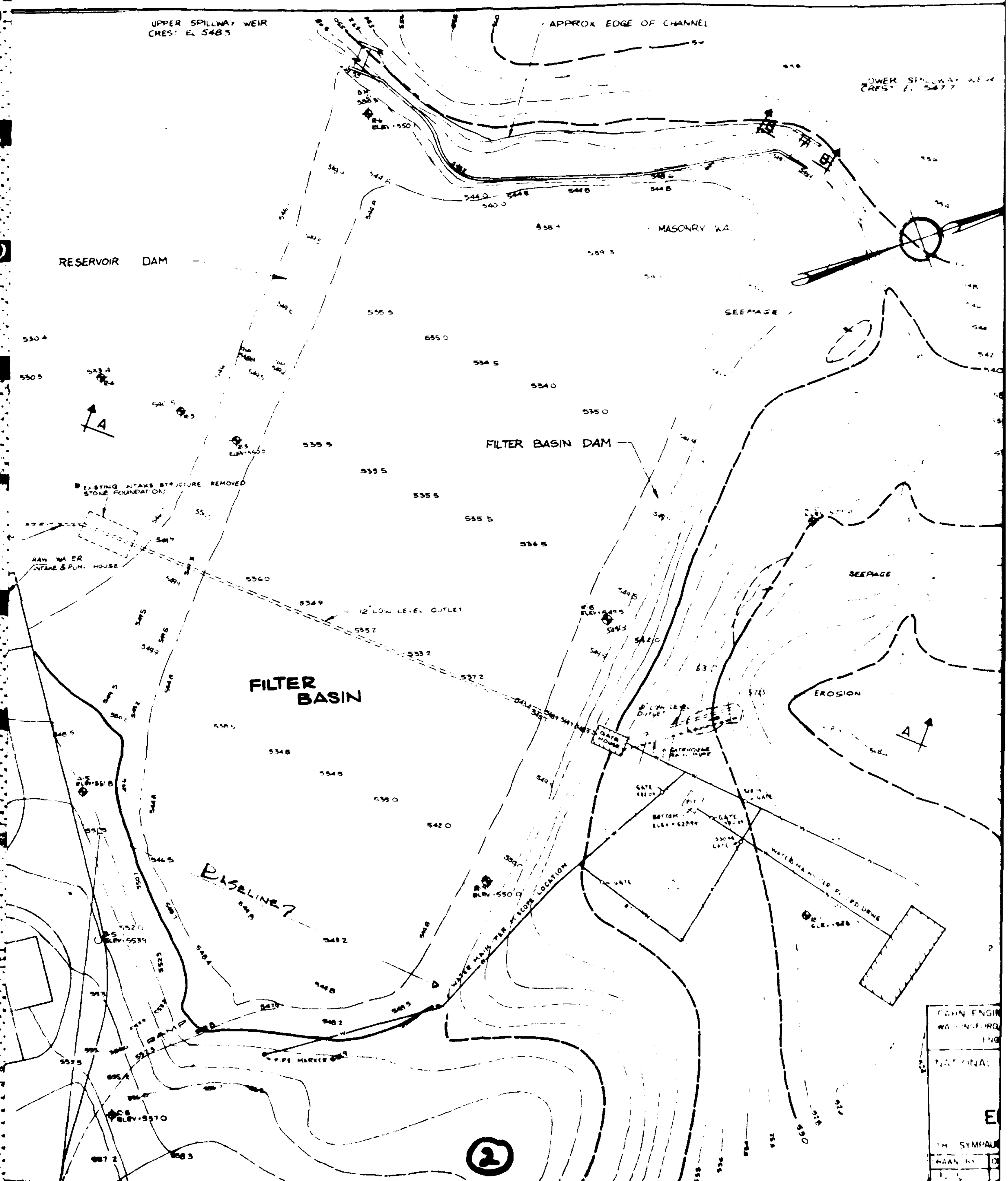
AREA EVALUATED		CONDITION
OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS		
a) Approach Channel		
General Condition		appears good
Loose Rock Overhanging Channel		none observed
Trees Overhanging Channel		none observed
Floor of Approach Channel		hand placed riprap, good
b) Weir and Training Walls		Upper & lower concrete sill with masonry training walls
General Condition of Concrete		Upper weir - good; lower weir - poor
Rust or Staining		none observed
Spalling		wash-out of sill at lower weir, cracks in channel right training wall
Any Visible Reinforcing		none observed
Any Seepage or Efflorescence		none observed
Drain Holes		N/A
c) Discharge Channel		
General Condition		poor
Loose Rock Overhanging Channel		none observed
Trees Overhanging Channel		some
Floor of Channel		boulders & rocks
Other Obstructions		heavy brush on slopes & floor of discharge channel

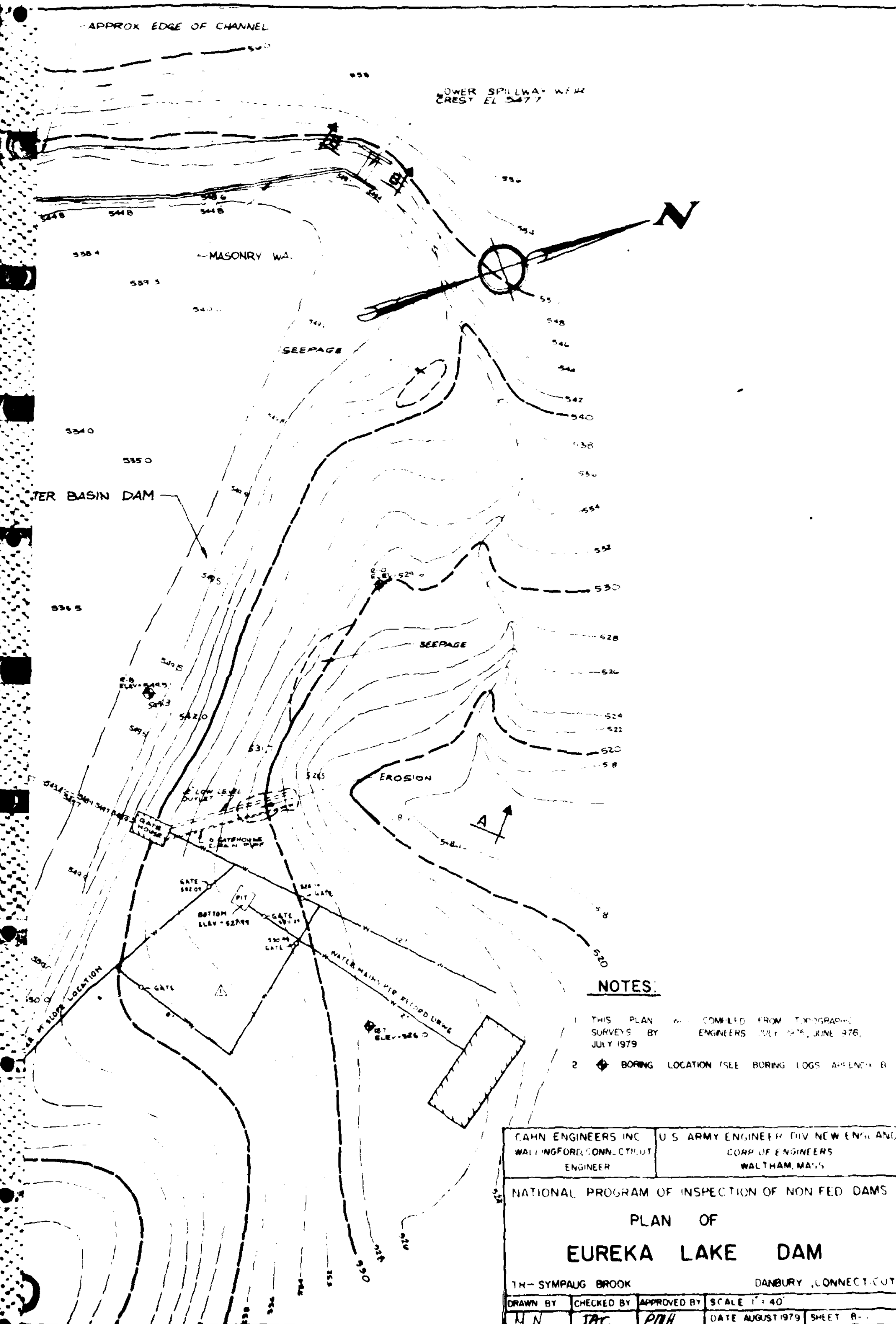
APPENDIX B

ENGINEERING DA"A AND CORRESPONDENCE



RESERVOIR DAM
RESERVOIR
FILTER BASIN
SETTLING LAGOON
SETTLING LAGOON
WATER TREATMENT PLANT
RAW WATER INTAKE & PUMP HOUSE
A
531.5
530.2
530.0
529.8
530.4
530.5
535.0
539.3
537.5
540.8
A 2 ELEV-556.1
A 4 ELEV-553.5
O A 3/4
O A/B-2
B 2 ELEV-563.0
B 5 ELEV-560.5
B 4 ELEV-556.4
B5 ELEV-553.9
A 5 ELEV-551.8
C 5 ELEV-551.0
O C-3 ELEV-561.7
ELEV-565.4
ELEV-567.6
1


UPPER SPILLWAY WEIR
CREST EL 548.5
APPROX EDGE OF CHANNEL
LOWER SPILLWAY WEIR
RESERVOIR DAM
MASONRY WA
SEEPAGE
FILTER BASIN DAM
EXISTING INTAKE STRUCTURE REMOVED
STONE FOUNDATION
RAW WATER
INTAKE & PUMP HOUSE
12" LOW LEVEL OUTLET
FILTER
BASIN
GATE HOUSE
SEEPAGE
EROSION
BASELINE 7
RAMP
PIPE MARKER
WATER MAIN PIPE AT SLOPE LOCATION
NATIONAL



NOTES:

1. THIS PLAN WAS COMPILED FROM TOPOGRAPHIC SURVEYS BY ENGINEERS JULY 1976, JUNE 1976, JULY 1979
2. ◆ BORING LOCATION (SEE BORING LOGS APPENDIX B

CAHN ENGINEERS INC WALLINGFORD, CONNECTICUT ENGINEER	U S ARMY ENGINEER DIV NEW ENGLAND CORP OF ENGINEERS WALTHAM, MASS

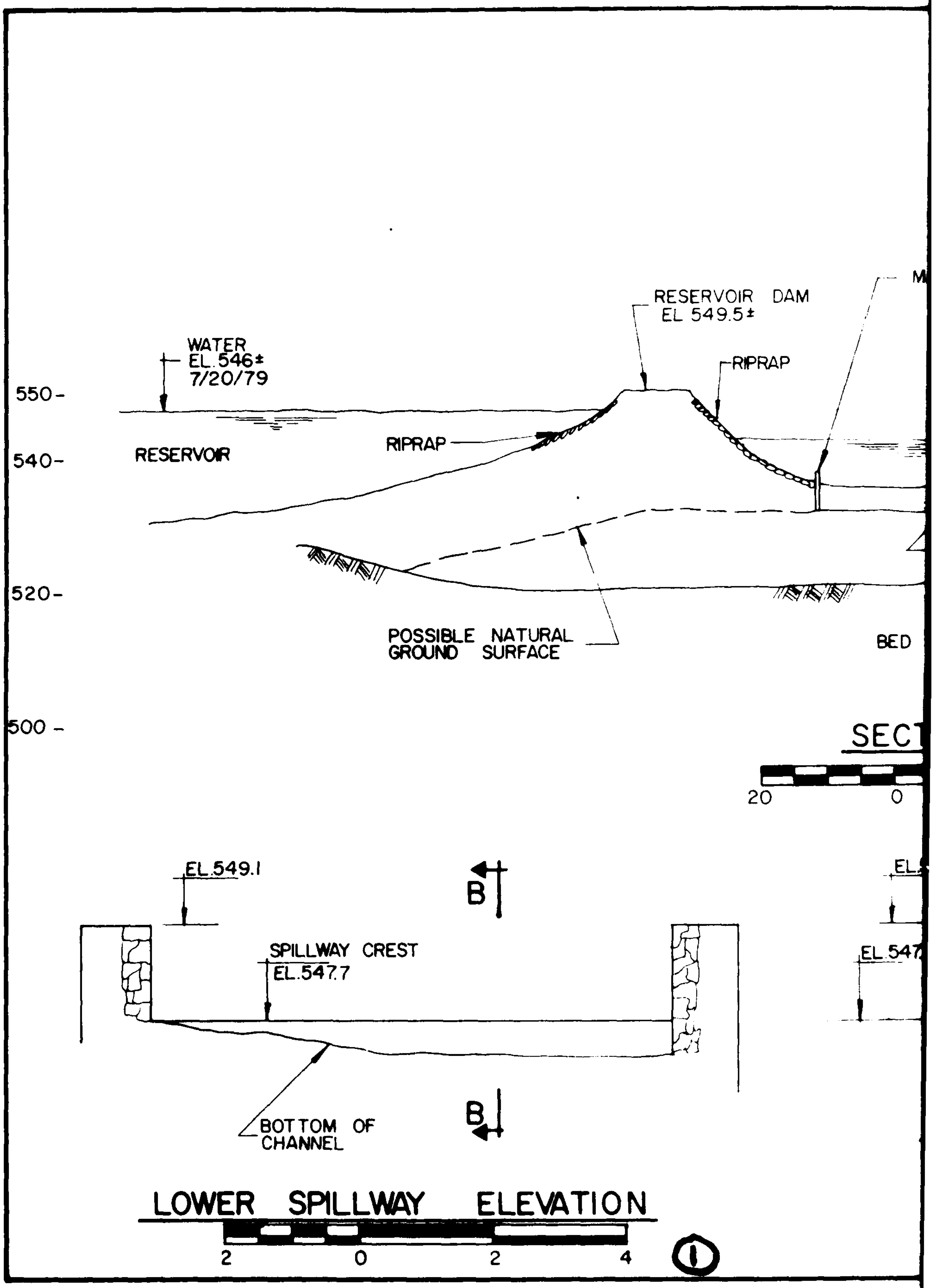
NATIONAL PROGRAM OF INSPECTION OF NON FED DAMS

PLAN OF

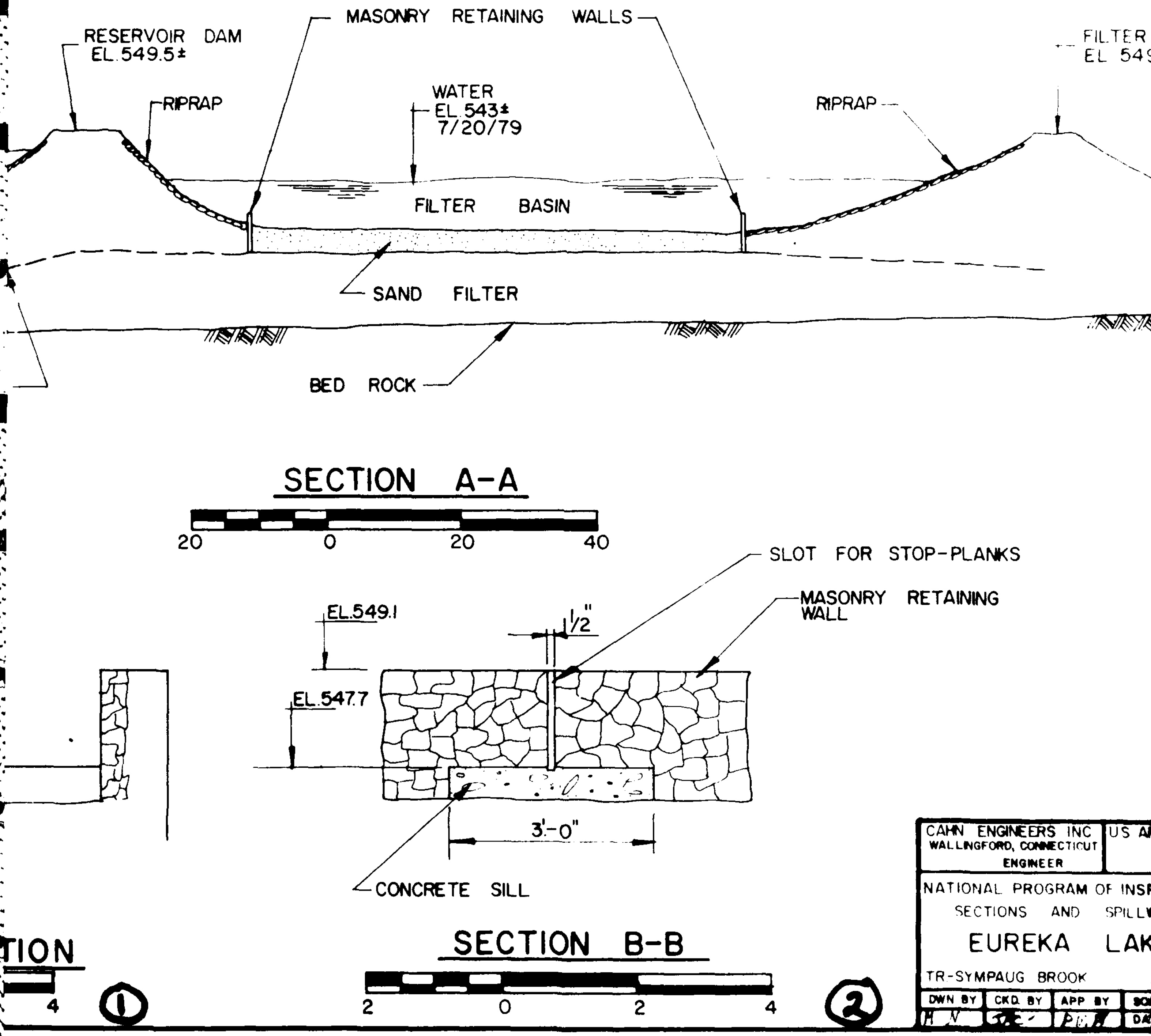
EUREKA LAKE DAM

TR - SYMPAUG BROOK — DANBURY, CONNECTICUT

DRAWN BY	CHECKED BY	APPROVED BY	SCALE 1" = 40'	
MN	JAC	PMH	DATE AUGUST 1979	SHEET B-

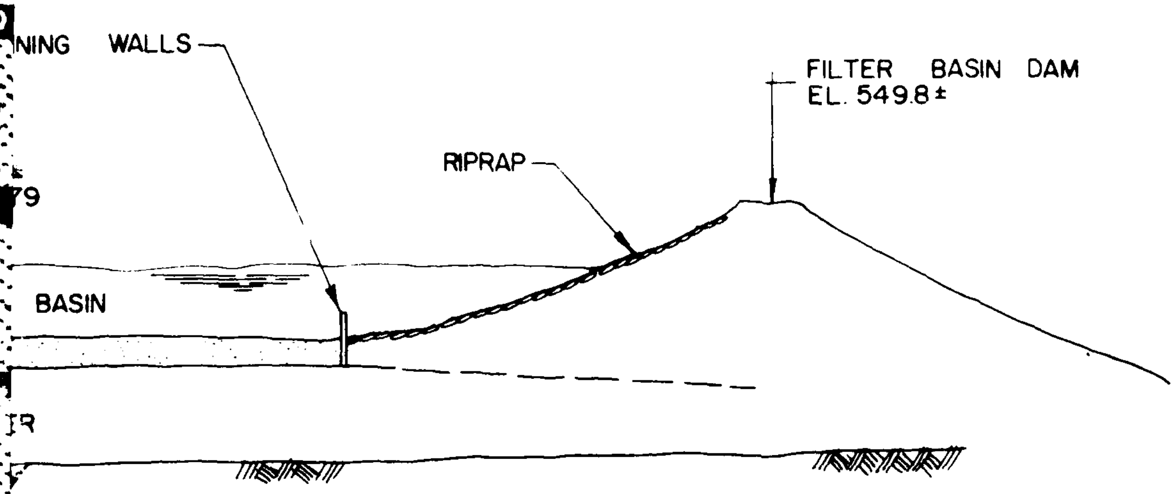


RESERVOIR DAM
EL 549.5±
WATER
EL. 546±
7/20/79
RIPRAP
550-
540-
520-
500 -
RESERVOIR
RIPRAP
POSSIBLE NATURAL
GROUND SURFACE
BED
SECT
20
0
EL.549.1
B
SPILLWAY CREST
EL.547.7
EL.547
B
BOTTOM OF
CHANNEL
LOWER SPILLWAY ELEVATION
2
0
2
4
1



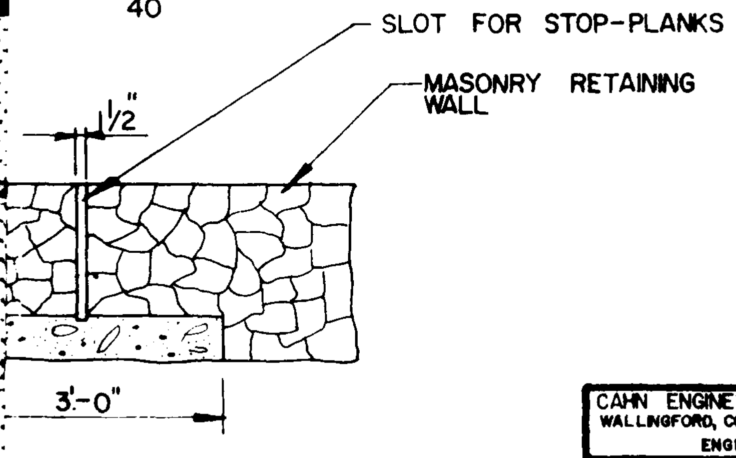
CAHN ENGINEERS INC WALLINGFORD, CONNECTICUT ENGINEER	US A
NATIONAL PROGRAM OF INSP SECTIONS AND SPILLW EUREKA LAK TR-SYMPAUG BROOK	

DWN BY	CKD. BY	APP BY	SC
H. V.	[illegible]	P. [illegible]	DA



A

40



CTION B-B

0 2 4

2

CAHN ENGINEERS INC.
WALLINGFORD, CONNECTICUT
ENGINEER

U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SECTIONS AND SPILLWAY ELEVATION

EUREKA LAKE DAM

TR.-SYMPAUG BROOK DANBURY, CONNECTICUT

DWN. BY	CKD. BY	APP. BY	SCALE: AS NOTED	
M. N.	[illegible]	P.M.	DATE: AUGUST 1979	SHEET B-2

EUREKA LAKE DAM

EXISTING PLANS

"Plan and Lands"
The Bethel Water-Works (1891)
W.B. Rider, C.E.
2 sheets

"Slow Sand Filter"
Bethel, Conn. (Aug., 1960)
The Henry Souther Engineering Co.
Laurel St., Hartford, Conn.
1 sheet

"Pumping Station"
Bethel Water Dept. (Oct., 1962)
1 sheet

"Eureka Water Treatment Plant"
Town of Bethel, Conn.
Cahn Engineers, Inc.
Wallingford, Conn. (June 1976)
20 sheets

"Dam Inspection"
Town of Bethel, Conn. (July, 1975)
Cahn Engineers, Inc.
Wallingford, Conn.
2 sheets

SUMMARY OF DATA AND CORRESPONDENCE

Date	To	From	Subject	Pg.
July, 1947	Water Department Bethel, Conn.	Thomas M. Riddick, Consulting Engineer	Report on Water Works	B-3
Feb. 11, 1966	State of Connecticut Water Resources Commission	Clarence Blair Ass. Civil and Sanitary Engineers	Inspection Report	B-15
Sept. 18, 1975	Town of Bethel	Cahn Engineers, Inc. Consulting, Engineers	Inspection Report	B-19
March 28, 1977	Mr. Victor Galgowski Water Resources Unit Department of Environmental Protection	Cahn Engineers, Inc. Consulting Engineers	Construction at dam	B-59
March 28, 1977	Department of Environmental Protection, Water and Related Resources	Town of Bethel	Construction Permit	B-61

WATER DEPARTMENT
BETHEL, CONNECTICUT

REPORT ON WATER WORKS

SELECTMEN

Frederick H. Judd
Thomas C. Mannion
Edgar C. Platt, Sr.

BOARD OF FINANCE

Harold B. Senior
E. Ambrose English
Frank Mannion
George F. Carroll
Neil Lamond
Andrew Weber

THOMAS M. RIDDICK
Consulting Engineer
369 East 149th Street
New York City

July, 1947

NEED FOR SURVEY

A complete and comprehensive Water Works Survey has long been needed in Bethel.

Most of the distribution system was laid between 1878 and 1890, and with the exception of transmission lines, practically all piping was four inches in size. Although carrying capacity was adequate for domestic use at the time it was laid, these pipelines have now corroded and tuberculated to such an extent that carrying capacity has been reduced more than fifty per cent. Pressures on the distribution system are inadequate for domestic consumption during times of high rates of flow, and from the standpoint of fire protection, this four inch piping offers only a false sense of security, regardless of static pressures.

The original (Eureka source) was well selected, and its use as the main supply should be continued. The yield ofthe watershed has been fully developed by two impounding reservoirs. For the past ten years supply has been equal only to normal consumption. Today water usage has so increased that a dry year (of say 35 inches rainfall) would produce a very serious water shortage. Several new factories have recently been connected to the distribution system, and a few additional are contemplated. These will impose a still greater burden on the Eureka System.

The problem today is threefold. First, there is a need to increase the supply sufficiently to provide for all normal demands during dry years for the period of bond issue (say 25 to 30 years); second, to revamp the distribution system and to replace most of the existing four inch mains with larger sizes of pipe; and third, to improve the general quality of water delivered to consumers, if possible.

HISTORY OF WATER DEPARTMENT

The Bethel Water Department was formed under a Charter granted by the January session of the Connecticut Legislature in 1878, and approved by the Borough of Bethel on April 10th of the same year.

A report was made on May 13, 1878, by Mr. D.G. Penfield, Engineer, in which he estimated the cost of construction of Eureka Dam, transmission main to the Borough, Distribution System, etc., at $26,141.00.

Bonds were issued on September 2, 1878, in the amount of $25,000.00, and a contract for $23,000.00 was awarded on June 10, 1878 to D. A. Chappell, Contractor (Chicago) for this construction.

In 1880 the Second Annual Report states that the distribution mains (which probably included supply mains) totaled about five miles, with 26 hydrants.

By 1891 the distribution system (and probably the supply system) totaled eleven miles, with 63 hydrants.

The likelihood of a water shortage arose in 1893. To augment Eureka Reservoir, a channel was opened from Mountain Pond, which permitted the drawing down of this source some three feet below the spillway level.

In 1878 a crude system of filtration was adopted. Sponges (and charcoal for taste improvements) were placed in the original gate house. This installation soon proved inadequate, and in 1892 a contract was let to William B. Ryder & Son, Engineers and Contractors, for the construction of the Eureka Slow Sand Filters, at a cost of approximately $8,000. The contract called for the erection of a second dam across the valley (upper dam constructed 1878) just below that of the existing Eureka Dam.

Another water shortage in 1892 necessitated the purchase of a pump for Mountain Pond Reservoir, which was evidently below the level from which they could draw by gravity.

In 1893 a contract was let to Peter Sweeney for the construction of a pipeline from Mountain Pond to Eureka Reservoir, presumably to replace the existing channel.

The highway at Eureka Reservoir was abandoned in 1894 and a new road located. Considerable land lying between the road and the reservoir, and in the vicinity of Mountain Pond was purchased.

By 1901 the capacities of [illegible] and Mountain Pond Reservoirs were inadequate. A contract was awarded to L. T. Andrews for the construction of a dam at Mountain Pond to further increase the storage of this collecting reservoir.

It became necessary in 1908 to provide water at sufficient pressure to supply Hoyts Hill and other areas situated at a relatively high elevation. An Artesian well was drilled at a cost of approximately $1,100. This well failed to develop the required yield as the location (on Hoyts Hill) was very poor since it had no appreciable drainage area.

Further sources were investigated, and in 1910 a dam was constructed at Wolf Swamp, impounding what is now known as Chestnut Ridge Reservoir. The contract was let to J. Boas for approximately $33,000, and included 5329 feet of pipe - principally 12" size.

Another pump was purchased in 1912, probably for use at Mountain Pond, when the elevation of this reservoir dropped below that of gravity flow.

The raw Chestnut Ridge Reservoir water has always been of poor physical and chemical quality. Color ranges from 50 to 100 ppm, and iron from about 0.4 to 2.0 ppm. In an attempt to improve the quality of this water, pressure filters were installed at the Chestnut Ridge Reservoir in 1913, at a cost of approximately $5,800.

These units did not effectively treat this water, and in 1926 and 1927, a Rapid Sand Filtration Plant was constructed, costing approximately $18,000.

In 1933 the Eureka Slow Sand Filter, long overloaded, was enlarged at a cost of approximately $[illegible],500, and a Venturi Meter (approximately $1,200) was installed on the transmission main from Eureka Reservoir.

The rapid sand filtration plant (Chestnut Ridge) was designed with a rated capacity of 100,000 gallons per day. Filter units were built in duplicate - 100,000 g.p.d. each, and the coagulation basin had a detention of four hours at 100,000 g.p.d., or two hours at 200,000 g.p.d. Due to increased water usage on the high service district, the capacities of the coagulation and clear water basins were insufficient, and additional basins were constructed in 1936 at a cost of approximately $6,500.

In 1946 the Connecticut State Department of Health ordered the installation of a Chlorinator at the Chestnut Ridge Plant. Plans and Specifications were prepared by me for the work, and also for the badly needed general plant renovation. A Chlorinator was temporarily installed in the Filter Building, but the required renovation was deferred.

A threatened water shortage in late 1946 and early 1947 necessitated a general survey of the entire water system.

[illegible]

Your water collecting, treatment, and distribution facilities are as follows:

1. <u>Low Service S[illegible]</u>

A. <u>Mountain Pond</u>

Mountain Pond is essentially a small collecting reservoir situated on the Eureka watershed. The elevation of the spillway is approximately [illegible] feet and drainline [illegible] feet. This reservoir impounds approximately [illegible] million gallons, which are available by gravity, and an additional 10-20 million gallons may be discharged to Eureka Reservoir by pumping. The drainage area is 0.17 square miles, of which 12 per cent is water surface. Storage amounts to 428 million gallons per square mile of land surface, which is more than ample for the size of the catchment area. The reservoir is relatively deep (15 feet average) and this factor prevents the creation of tastes and odors due to algae or weed growths. Average yield is estimated at 0.16 M. G. D.

B. <u>Eureka Reservoir</u>

Eureka Reservoir impounds approximately 68 million gallons with overflow level at elevation 551 feet. The drainage area is 0.31 square miles, of which 13 per cent is water surface. Storage amounts to 252 million gallons per

square mile of land surface, and reservoir depth averages about 6 feet. This classifies this reservoir as being relatively shallow and tastes and odors are often present in the water due to growths of algae and weeds. This condition is accentuated in the late summer and fall months when the reservoir level may drop from 3 to 5 feet. Average yield is estimated at 0.28 M.G.D.

Mountain Pond is generally retained as a reserve supply, so as to maintain as high an operating level as possible in the Eureka Reservoir.

The combined drainage areas total 0.48 square miles and provides a storage of 152 M. G. This is equivalent to a storage of 314 M. G. per square mile of land surface, which is adequate for the watershed. A value of approximately 250 is considered satisfactory, and 400 (M.G.D. per square mile of land surface) is high.

These reservoirs are sufficiently large to accommodate an additional drainage area (land surface) of 0.11 square miles at a rating of 250 M. G. per square mile, 0.24 square miles at a rating of 200, or 0.46 square miles at a rating of 150.

The safe yield under these conditions is estimated as follows:

Drainage Area Sq. Mi. Land Surface	Storage M.G. Sq. Mile	Average Yield M.G.D.
0.42	314	0.42
0.53	250	0.51
0.66	200	0.61
0.88	150	0.72
1.32	100	0.99

It is obvious therefore, that by adding approximately 0.5 square miles of additional drainage area, the safe yield would be raised from 0.42 to 0.72 M.G.D., or an increase of 0.30 M.G.D., or 70 per cent.

This is of interest from the standpoint of increasing the yield of Eureka watershed by transfer of water from adjoining drainage areas (Kellogg property, West Redding Brook, Sympaug, etc.). It must be borne in mind, of course, that the above values are based on developing the full yield of the added watershed - by storage or pumpage of all surface run-off.

C. Eureka Slow Sand Filters

There are two Slow Sand Filters at Eureka Reservoir, each having an approximate surface area of 3500 square feet. The combined area is therefore 0.16 acres. The capacity of these Filters, at a rating of 5.0 M. G. per acre per day, is therefore 800,000 G.P.D., which is almost twice the average yield of Mountain Pond and Eureka watersheds. These Filters have very small storage basins, however, (6000 gallons or 10 minutes detention at

peak rate of consumption). Hence, they are operated during times of peak flow at a rate of 1.26 M.G.D. or at a filter rating of about 8 M.G./acre/day, which is excessive.

Additional filters would be costly to construct since there is no available area capable of economical development. This condition could be considerably improved by the construction of a storage basin and installation of a rate controller. The capacity of this basin would have to be at least 100,000 gallons, however, and it would involve considerable expense.

Another needed improvement is the installation of a partition wall between the filters, so that one unit could remain in service when the other was being cleaned. This improvement, however, should be held in abeyance for several years until the filters are rebuilt.

D. Chlorinating Station

A W & T Automatic Chlorinator is housed in a small frame structure, built over the transmission line from Eureka Reservoir. A Venturi Meter and Recorder are also located here.

The original building burned down and the new structure has been damaged twice by soot from the oil-burning stove.

It would be advisable to replace this building with a well insulated brick structure, and to heat it during the winter electrically. To prevent damage resulting from chlorine leaks, the building should be divided into

two sections, one to house the chlorine cylinders, and the other for the chlorinator and rate of flow recorder.

2. <u>High Service System</u>

A. <u>Chestnut Ridge Reservoir</u>

This reservoir has a drainage area of 0.64 square miles, of which 15 per cent is water surface. A dam provides 63 M.G. of storage and an average depth of 8 feet. Like Eureka Reservoir, this shallow depth fosters growths of algae and weeds, which sometimes impart a disagreeable taste and odor to the water. The average yield is estimated at 0.27 M.G.D., which is greater than consumption on the High Service District. The reservoir, therefore, is normally maintained at a high level.

The physical and chemical qualities of this water are very bad, due to high color, high iron, and low alkalinity. In the light of present knowledge it is doubtful that this source of supply should have been selected.

B. <u>Chestnut Ridge Rapid Sand Filtration Plant</u>

The poor quality of Chestnut Ridge water has always been a souce of trouble. Pressure filters were installed three years after the dam was erected but they were not able to properly treat this water. They were replaced by a Rapid Sand Filtration Plant (present capacity 0.2 M.G.D.) in 1926, but since there was no electric power at the site,

this plant had to be designed for semi-automatic operation, which is impractical for so small a Water Works. Today the plant is badly in need of renovation and enlargement. An aerator is required, the filters need complete rebuilding, rate controllers should be replaced, the existing chlorinator and hydraulic pumps should be properly located in an extension to the building. A Venturi Meter and Recorder are required for measurement of flow, a washwater pump is required for backwashing filters, and a new filter unit is necessary.

The cost of this work is estimated at about $25,000.

Even with these improvements and the added facility of electric power (now on hand) this plant will still be difficult to operate on a part-time basis, and it is entirely too small for employment of three shifts of operators. Under these conditions no great improvement in the quality of water delivered to consumers can be assured, and the recent requirement (by the State Health Department) of continuous chlorination has and will continue to result in occasional periods when chlorinous tastes will be imparted to the water.

This plant can be more economically abandoned and held for emergency use, than renovated.

CLARENCE BLAIR ASSOCIATES
Civil and Sanitary Engineers
93 WHITNEY AVENUE
P. O. BOX 236
NEW HAVEN, CONNECTICUT 06502
TEL. 777-7379

...GER C. BROWN
JAMES C. BEACH
...NK RAGAINI
...ARENCE M. BLAIR
(1904-1944)

CHARLES ... AUG..., JR
JOHN M. BREST
DONALD L. DIS...
NICHOLAS PIPERAS, JR

(3447)

February 11, 1966

State of Connecticut
Water Resources Commission
State Office Building
Hartford 15, Connecticut

Re: EUREKA LAKE DAM
DANBURY, CONNECTICUT

Gentlemen:

Herewith is my report on Eureka Lake Dam in the Town of Danbury, Connecticut.

1. IDENTIFICATION

This report was made at the request of Mr. William P. Sander in a letter dated May 25, 1965.

An inspection of the structure was made by the writer and an assistant engineer on October 21, 1965.

A survey and profiles of the spillways were made on July 6, 1965.

The dam is located in the Town of Danbury, adjacent to the Danbury-Bethel town line on a tributary of Sympaug Brook and about 1.5 miles south westerly of the center of Bethel, at

Latitude 41-21-50

Longitude 73-26-15

The owner is the Village of Bethel Water Department.

2. FACTORS OF HAZARD

The valley downstream from the dam is narrow and has a steep gradient for about 0.3 of a mile.

A highway crosses the valley about 200 feet below the dam and another one about 1700 feet below.

Failure of the dam would undoubtedly cause considerable damage to both of these highways. There are no dwellings that are considered to be in a hazardous location. Below the second highway the stream enters a relatively wide, swampy, flood plain.

The reported capacity of the lake is 68 million gallons.

A possible hazard to this dam is the existence 3000 feet upstream of Mountain Pond Dam, subject of another report under this date.

Mountain Pond Dam stores about 64 million gallons and if it gave way during flood flow conditions it might tax the overflow capacity of Eureka Lake Dam.

However, Mountain Pond Dam is an earth dam and would probably release its storage slowly.

3. STRUCTURE

Eureka Lake Dam is an earth dam 250 feet long and approximately 30 feet high. Top width is 12 feet. The upstream slope is riprapped.

A filter basin has been constructed against the downstream slope of the dam by the construction of another embankment across the valley about 100 feet downstream from and parallel to the main dam. The top of this downstream embankment is 0.25 higher than the main dam. Water level in the filter basin was 2 inches lower than in the main lake at the time of our inspection.

The main dam has a spillway at its west end which discharges into a spillway channel extending along the west side of the filter basin to a point below the downstream embankment. The spillway on the main dam is 8 feet wide and the freeboard from the weir to the top of the embankment is 1.67 feet.

The filter basin is separated from the spillway channel by a masonry wall. This wall forms an overflow for the filter basin, with a freeboard of 1.75 feet to the top of the downstream embankment and about 80 feet long.

Some seepage was visible along the toe of the downstream slope of the downstream embankment. This was not sufficient to be considered a potential hazard.

In general, this dam and its appurtenances were in good condition and well maintained.

4. HYDROLOGY

Approximately 3000 feet upstream from these two dams is Mountain Pond Dam.

The drainage area tributary to Mountain Pond Dam is 90 acres or 0.14 square miles.

The drainage area tributary to Eureka Lake Dam but below Mountain Pond Dam is 205 acres or 0.32 square miles.

The total drainage area tributary to Eureka Lake Dam is then 0.46 square miles of which 30% is partially controlled by Mountain Pond.

Mountain Pond has a water surface comprising about 19% of its drainage area and therefore has an appreciable delaying effect on peak runoffs at the lower lake. A discussion of peak outflow at Mountain Pond is included in the report on that dam.

A hypothetical discharge at Eureka Lake was developed by use of a runoff hydrograph based on a storm having a rainfall of 6 inches in 12 hours. This storm has a recurrence interval of once in 100 years. A runoff factor of 100% was assumed.

The peak inflow at Eureka Lake was estimated to be 160 cfs. The inflow-outflow curves showed a peak outflow of 61 cfs. This would result in a maximum stage of 2.1 feet above the spillway weir of the main dam, and would overtop the dam by 0.4 feet.

The downstream embankment of the filter basin is slightly higher than the main dam and the overflow over the main dam into the filter basin would discharge over the masonry wall at the west end of the basin into the spillway channel.

5. SAFETY

In my opinion this dam is safe at the present time.

I do not believe that this dam requires periodic inspection by your Commission.

6. REQUIREMENTS

No work is necessary to put the dam in a safe condition.

It would be advisable as a precautionary measure to keep the spillway channel mowed and free from brush and weeds or other debris.

7. STATEMENT OF FACTS

Eureka Lake is a unit of the water supply system of the Village of Bethel Water Department.

Water Resources Commission February 11, 1966
Eureka Lake Dam, Danbury, Conn.

The lake is impounded by an earth dam 250 feet long and approximately 30 feet high.

A filter basin has been constructed against the downstream slope of the dam by the construction of another dam or embankment, about 100 feet from and parallel to and to approximately the same height as the main dam.

A giving away of the structure would undoubtedly cause considerable damage to two highway crossings downstream. At the present time there are no dwellings which were judged to be in a hazardous location in case of a dam failure.

The drainage area tributary to the dam is 0.46 square miles of which 30% is partially controlled by an upstream dam.

A hypothetical storm of 100 year frequency was estimated to produce a peak outflow of 61 cfs. at Eureka Lake Dam. This would produce a stage which would overtop the main dam by 0.4 feet, a condition which is not considered hazardous because of presence of the filter basin with its adequate overflow weir immediately downstream.

8. CONCLUSION

In my opinion the dam is safe at the present time and no action is required.

9. RECOMMENDATION

No action necessary except perhaps to urge the owner to keep the spillway clean.

Respectfully submitted,

Roger C Brown

Roger C. Brown
Consulting Engineer

Cahn Engineers Inc.
CONSULTING ENGINEERS-COMMUNITY DEVELOPMENT CONSULTANTS

September 18, 1975

Mr. Frank Clark, First Selectman
Town of Bethel
Bethel Town Hall
Bethel, Connecticut 06801

RE: Dam Inspection
Eureka Lake Dam
Bethel Water Supply

Dear Mr. Clark:

We are pleased to submit in accordance with our agreement for engineering services with the Town of Bethel, our report on the Eureka Lake Dam Inspection.

The reservoir dam and filter basin dam are visually sound, and excluding abnormal operating procedures or unusual natural occurrences, no apparent hazard exists which may endanger the safety of the public. Outlined on Pages 1 and 2 of our report are recommendations regarding maintenance and upgrading of the existing dam. We recommend that the remedial work or upgrading of the existing dams be carried out as soon as possible, and that annual maintenance be conducted thereafter.

We will incorporate special conditions in our plans and specifications for the water treatment plant to ensure that the dam is protected during construction in accordance with recommendation "f" of this report.

We would like to acknowledge the support and assistance we received during the preparation of this report from the Town and especially from Larry Straiton. We appreciate the opportunity of preparing this report and look forward to being of continued service in assisting you in repairing the existing dams.

Very truly yours,

W. O. Doll, P.E.
Chief Engineer

Peter M. Heynen, P.E.
Chief Geotechnical Engineer

PMH:mbm

ALEXANDER DRIVE, WALLINGFORD, CONNECTICUT 06492 PHONE (203) 265-6741
ESTABLISHED 1909

TABLE OF CONTENTS

8/24/75 14 426 SØ

CONCLUSIONS AND RECOMMENDATIONS

The reservoir dam and the filter basin dam are visually sound and, excluding abnormal operating procedures or unusual natural occurrences, no apparent hazard exists which may endan the safety of the public. No signs of embankment instability such as: piping of the embankment materials, (i.e. all seeping water is clear and no transportation of fine soil particles is occurring), cracking of the embankment, settlement along th embankment crest, sloughing along the embankment slopes, excessive animal burrows, or leakage through or along pipes were noted.

The following recommendations are made regarding maintenance and upgrading of the existing dams.

a. Clean out the spillway channel and maintain its outlet area (cut brush, trees, etc.). Attached is a picture of the growth of the spillway, Figure 1.

b. Backfill the area around the filter basin drain pipe or preferably extend the drain pipe away from the toe of the filter basin dam and backfill with rock. This erosion is causing an over-steepening of the overall downstream dam slope. Figure 2 shows the location of washed out area.

c. The filter basin dam should be exterminated of burrowing animals which are causing voids in the top of the dam. The use of smoke is good for detecting burrows such as the one observed through the dam just at the highwater mark. These should be thoroughly plugged with compacted soil. Figure 3 is the area where animals burrow.

d. A minimum of 1.5 to 2.0 feet of free board should be maintained for both dams. Free board is the distance from the water surface to the top of the dam. This must be maintained so that wave action or fast rising of the water will not overtop the dam. Figure 4 is an example of freeboard for the reservoir dam.

e. In the low-water operation of the reservoir, sand-bagging the downstream weir in the spillway should be limited so that there is a minimum of 1.5 - 2.0 of freeboard. Overtopping could be dangerous to the stability of the filter basin dam if the freeboard isn't maintained.

f. Construction operations and equipment on or near the dam should be done with extreme care. No heavy equipment such as dump trucks, front end loaders, etc. should be allowed on the dam.

SITE TOPOGRAPHY AND GEOLOGY

The topography of the dam site area is depicted on Exhibit No. 1. The reservoir lies in a high glacial valley with its water surface varying between elevation 546 and 548. Eureka Lake is fed at its southern end from a higher sister lake named Mountain Pond. This lake has a surface elevation of 591 (±) (USGS). The hills immediately adjacent to the lake rise to about elevation 700 (±). The dams which pond the lake are constructed in a rugged V-shaped valley which drops quickly to elevation 380 in a distance of approximately 1700 feet (straight-line distance). The geology of the dam site, as indicated by a survey of the outcrops in the area and by core borings taken for associated work, consists of fractured and folded dark coarse schists and shistose gneiss. Bedrock is overlain by varying thicknesses of glacial till. The till is basically a brown, fine to coarse sand and gravel having some to trace silt and numerous cobbles. The depth of overburden at the site varies from zero feet where the bedrock is outcropping to 28 feet thick within the V-shaped valley.

RESULTS OF INSPECTION

A. General

The reservoir dam for the public water supply of Bethel is constructed of native earth material consisting of brown fine to coarse sand, some fine to coarse gravel, some silt, and is protected on its upstream and downstream slopes by a thin layer of riprap. The dam is approximately 16 feet high with a length of 250 feet. The dam is 10 feet wide at its crest and has side slopes of 1 vertical to 2 horizontal both up and downstream. The dam is constructed on about 13 feet of glacial overburden which, in turn, rests on gray and white fractured gneiss.

The filter basin dam lies some 140 feet downstream of the reservoir dam and is quite similar in construction. It too is constructed of native earth material approximately 14 feet high with side slopes of 1 vertical to 2 horizontal. The length is about 280 feet and the width of the dam at the crest is about 6 feet. This dam is built on a sloping surface of about 15 feet of glacial till and on an old masonry wall on bedrock as indicated by Boring R-9. (See Profile, Exhibit No. 2).

B. Investigations

A thorough program of on-site investigations was carried out in the preparation of this report. The site was visually inspected both during full reservoir conditions and while the filter basin section of the reservoir was dewatered for replacement of the sand filter bed.

The investigative program also included an exploratory drilling program. (The boring location plan (Exhibit No. 1) and the boring logs are in the Appendix. A review of the historical records concerning the reservoir and aerial photographs of the area were obtained and analyzed.

C. Reservoir Dam

During the normal operation of the water supply system, it is necessary to drain the filter basin periodical At each draining the basin emptied in about 20 hours. The reservoir dam is subjected to this fairly rapid drawdown and it is reported and observed that seepage from the downstream face of the dam occurs only at or below approximately elevation 540 and only near the abutments (ends) of the dam when the elevation of the surface water is normal. This seepage is not substantial and there

was no evidence that soil is being carried from the embankment by the seeping water. No sloughing or slope instability was observed on the downstream face or along the dam crest. This type of seepage would be expected from a homogeneous dam section and is not considered significant.

D. Filter Basin Dam

The filter basin dam is likewise subjected to the previously described drawdown and rapid filling conditions. No sloughing or instability was noted in either the upstream or downstream face of this dam. Some areas of seepage were noted along the downstream toe of the embankment. At both the embankment contacts, (where the dam meets the existing soil), it appears that more seepage is taking place on the northwest side abutment.

The apparent seepage may be exaggerated by the fact that the spillway exits above the elevation of the seepage and runs over the natural ground surface back to the original stream channel. Some seepage occurs near the center of the embankment at about elevation 527 or some seven feet below the lowest possible pool in the filter basin area.

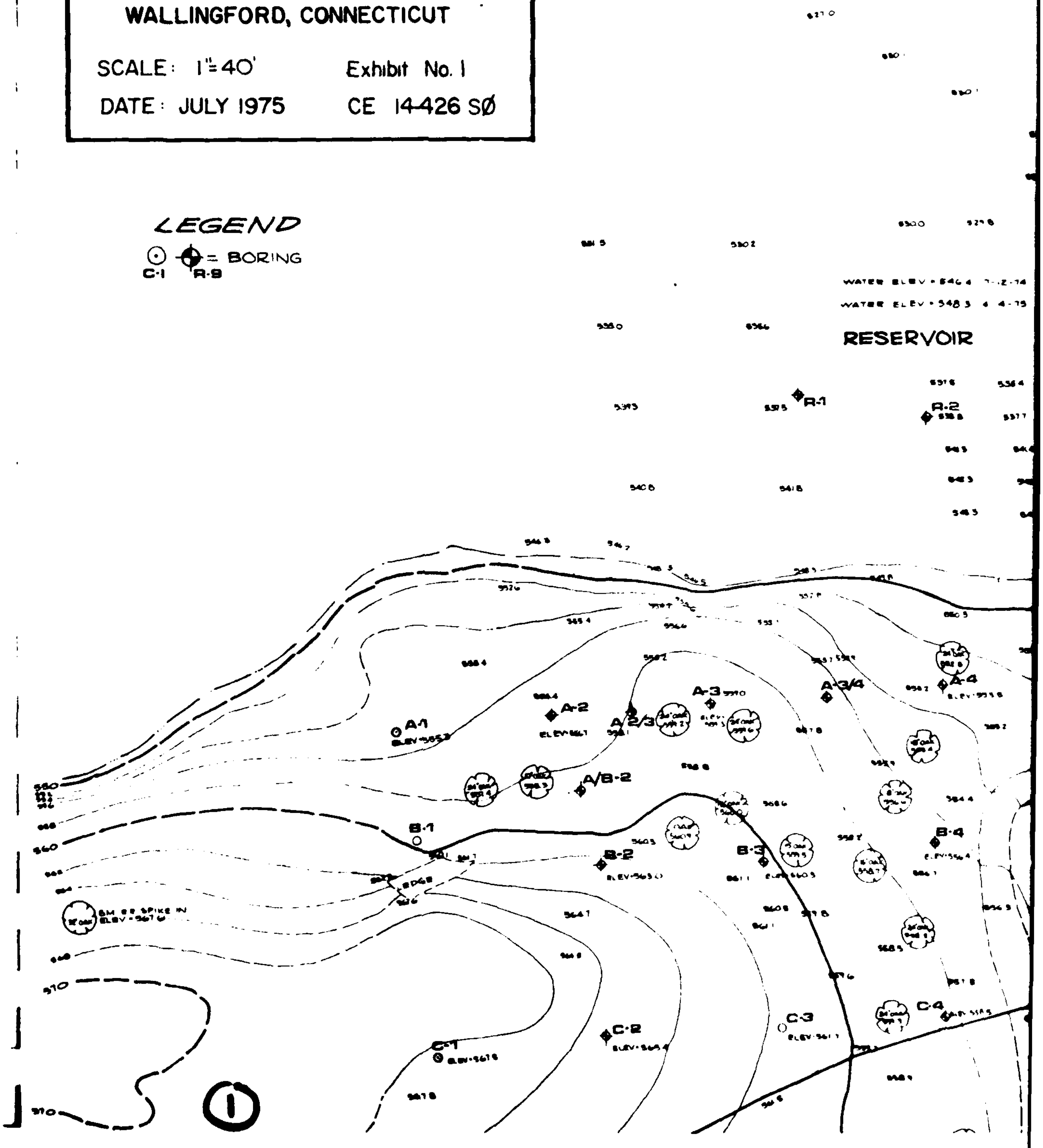
Although seepage downstream of the filter basin dam is apparently continuous and fairly significant at times (no quantity estimates are available), there is no evidence of the seepage piping materials from the embankment and no history of increased leakage. The seepage is no cause for concern as long as it is clear and is not transporting fine grain soil.

E. Appurtenant Structures

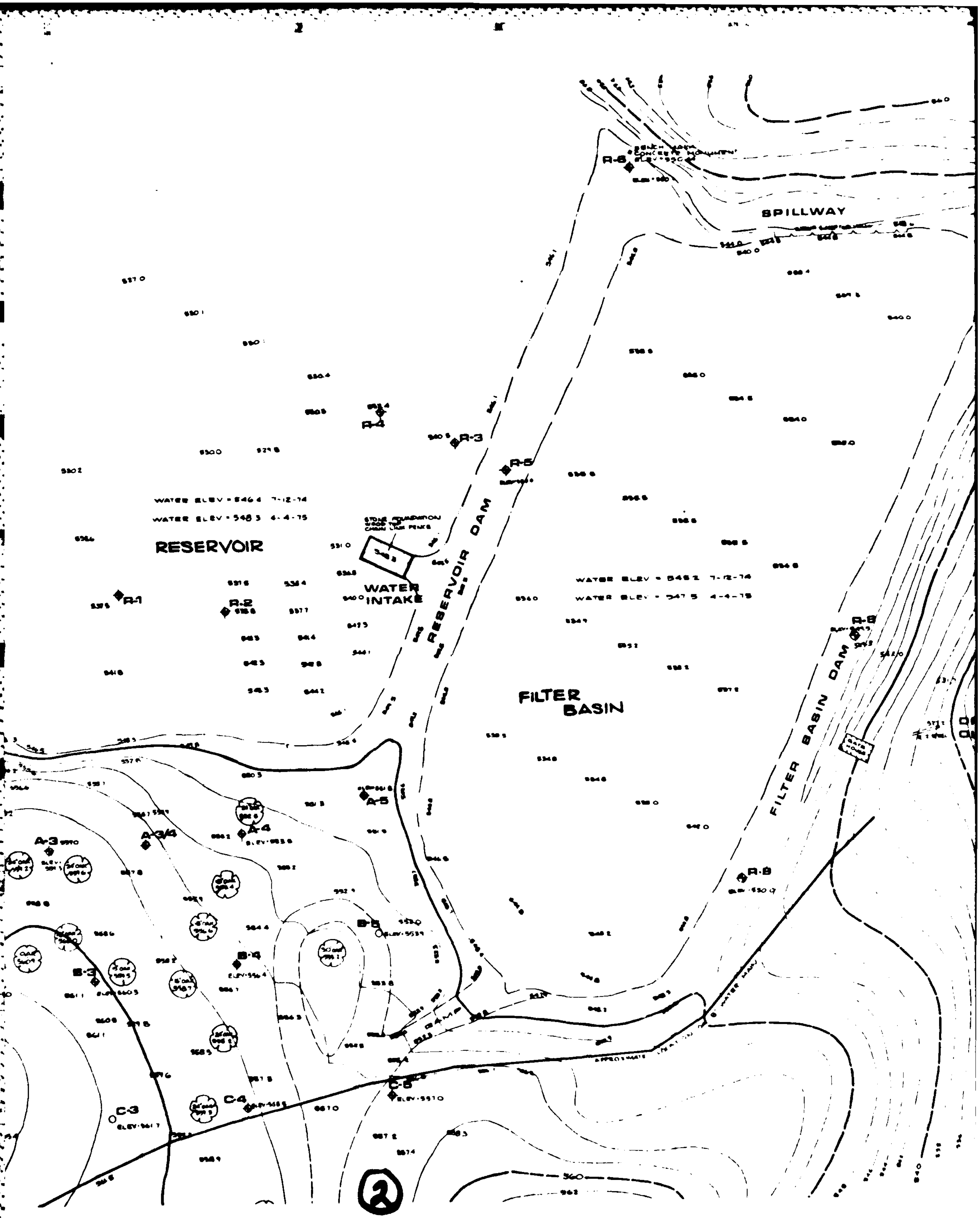
The raw water is piped through the dam into the filter basin. The water then percolates through the sand filter in the bottom of the basin and then is piped for chlorination and public consumption. An 8-foot wide, uncontrolled spillway with a crest at about elevation 546.5 lies at the northwest end of the dam. The spillway is formed by in-place rock on the valley wall and a masonry wall on the other side or against the dam embankments. The floor of the spillway appears to be paved with loose rock (boulder to cobble size). This spillway insures freeboard and passes excess water into the valley just downstream of the filter basin dam.

APPENDIX A

TOWN OF BETHEL
DAM INSPECTION
TOPOGRAPHIC AND BORING LOCATION PLAN
CAHN ENGINEERS INC. WALLINGFORD, CONNECTICUT
SCALE: 1"=40'   Exhibit No. 1 DATE: JULY 1975   CE 14-426 SØ

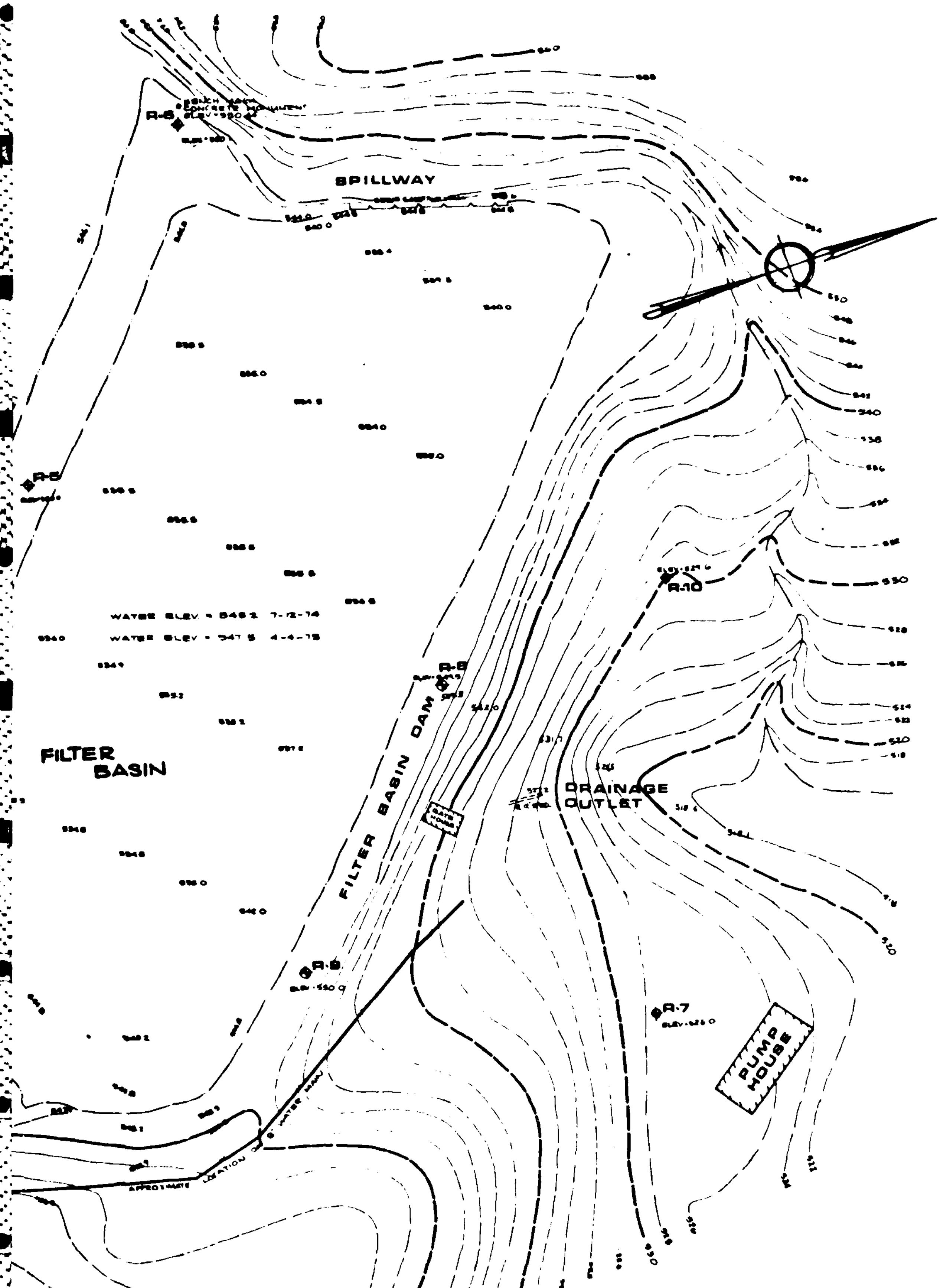


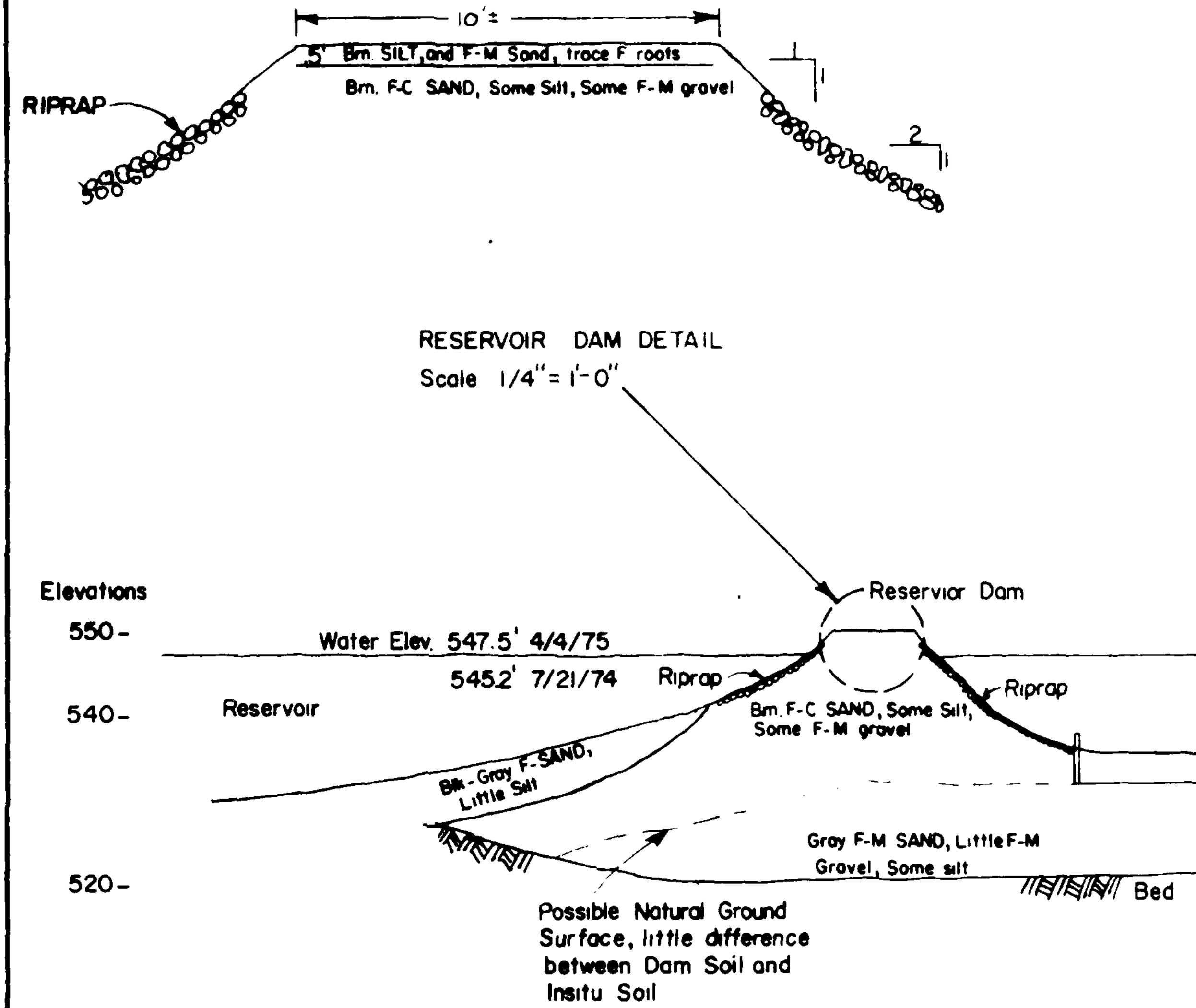
B-29



SPILLWAY
RESERVOIR DAM
RESERVOIR
WATER ELEV = 546.4 7-12-74
WATER ELEV = 548.3 4-4-75
WATER INTAKE
FILTER BASIN
WATER ELEV = 546.2 7-12-74
WATER ELEV = 547.5 4-4-75
FILTER BASIN DAM
R-1
R-2
R-3
R-4
A-3
A-3/4
A-4
A-5
B-3
B-4
C-3
C4
RAMP
560
2

B-17


SPILLWAY
BENCH MARK CONCRETE MONUMENT
R-6
R-5
R-8
R-9
R-10
R-7
WATER ELEV = 549.2 7-12-74
WATER ELEV = 547.5 4-4-75
FILTER BASIN
FILTER BASIN DAM
GATE HOUSE
DRAINAGE OUTLET
PUMP HOUSE
APPROXIMATE LOCATION OF 6" WATER MAIN


10'±
.5' Brn. SILT, and F-M Sand, trace F roots
Brn. F-C SAND, Some Silt, Some F-M gravel
RIPRAP
1
1
2
1
RESERVOIR DAM DETAIL
Scale 1/4" = 1'-0"
Elevations
550 -
540 -
520 -
500 -
Reservior Dam
Water Elev. 547.5' 4/4/75
545.2' 7/21/74
Riprap
Riprap
Reservoir
Brn. F-C SAND, Some Silt, Some F-M gravel
Blk-Gray F-SAND, Little Silt
Gray F-M SAND, Little F-M Gravel, Some silt
Bed
Possible Natural Ground Surface, little difference between Dam Soil and Insitu Soil

1

TOWI

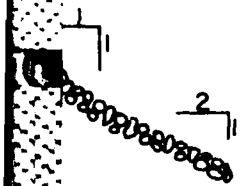
DAM

CRO

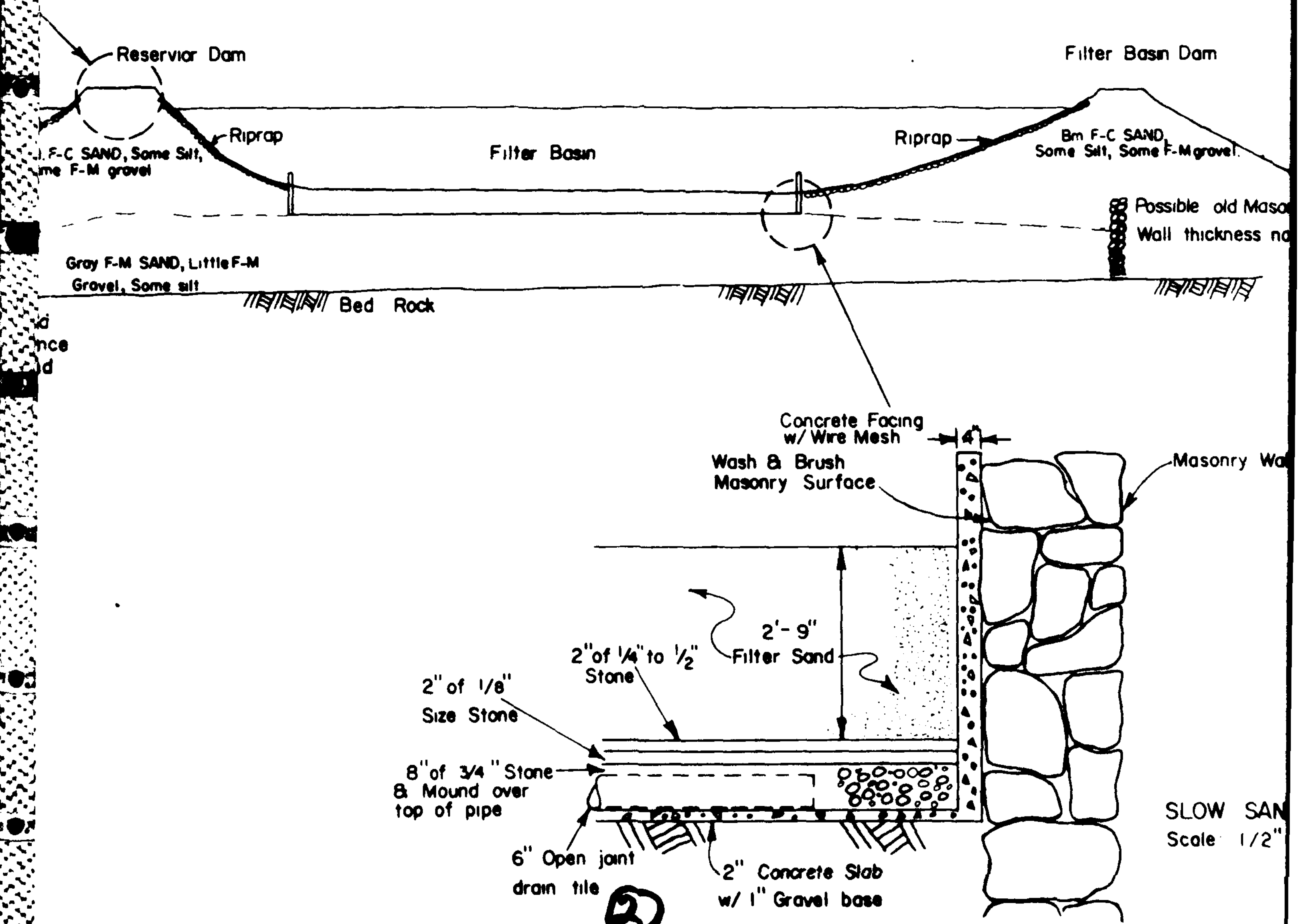
CAHN
WALLINGI

SCALE As s

DATE JULY

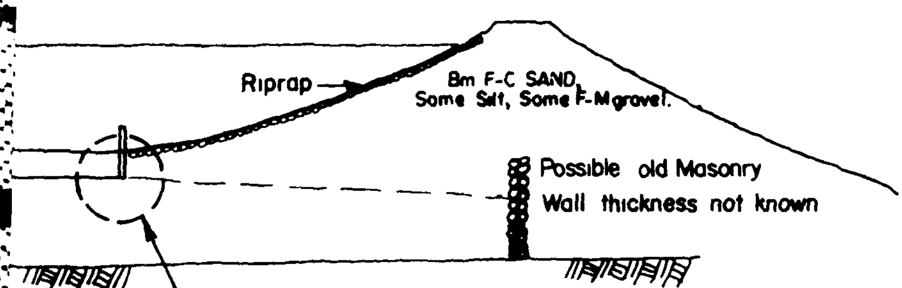


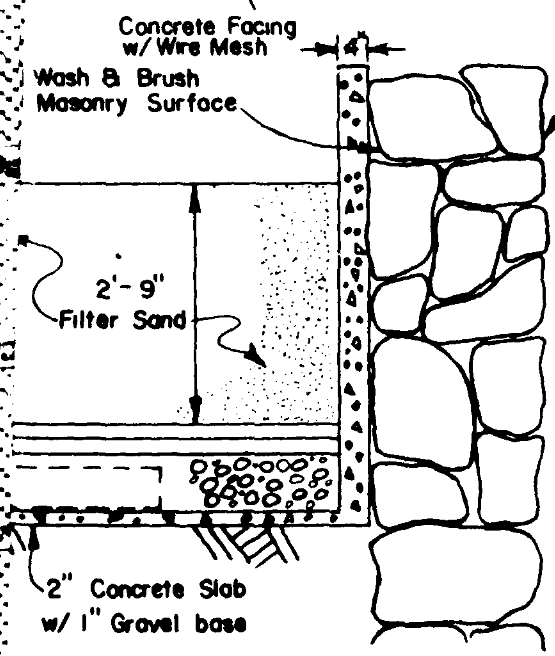
SECTION A-A
CROSS SECTION
Scale 1"=20'



TOWN OF BETHEL
DAM INSPECTION
CROSS SECTION
CAHN ENGINEERS INC. WALLINGFORD, CONNECTICUT
SCALE: As shown — Exhibit No. 2
DATE: JULY 1975 — CE 14-426 SØ

Filter Basin Dam





SLOW SAND FILTER
Scale: 1/2" = 1'-0"

FIG. 1

FIG. 2

FIG. 3

FIG. 4

APPENDIX B

General Borings, Inc.

Sheet ___ of ___

P. O. BOX 7135 PROSPECT, CONNECTICUT 06712

REPORT OF AUGER BORINGS AND PIPE AND BAR PROBINGS

TOWN Bethel LINE ___

PROJECT NAME Water Transmission Line PROJECT NO. ___

FOREMAN F.C. C.B. DATE WORK DONE 3/26/75 [illegible]

INSPECTOR R.T. FOR Town of Bethel

CONTRACTING ENGINEER

Station	Offset (Ft.) From B L	Offset (Ft.) From C L	Depth Probed (Ft.)	Soil Strata in Auger Holes From (Ft.)	Soil Strata in Auger Holes To (Ft.)	Remarks (Include: Groundwater depth, Size of Auger used, Description of Soil in Auger Holes, Depth of Auger Samples)
C-1				0'	.5'	Top soil.
				.5'	2.5'	Brown fine silty sand.
				2.5'	4.0'	Cobbles and boulders.
				4.0'	6.0'	Brown fine-medium sand, some fine-medium
						gravel.
			6.0'			Refusal at 6.0'. Ground Water Level-Dry
B-5				0'	4.0'	Brown fine-medium sand and silt, medium-f
						gravel.
				4.0'	7.0'	Brown fine-medium sand and silt, medium-f
						gravel, cobbles and boulders.
			7.0'			Refusal at 7.0'. Offset hole 5.0' North. Ground Water Level-Dry
B-5-A	OFFSET 5.0'		North	0'	8.0'	Brown fine-medium sand and silt, medium-f
						gravel, cobbles and boulders.
			8.0'			Refusal 8.0'. Ground Water Level-Dry
A-1				0'	1.0'	Top soil, brown fine-medium sand and sil[illegible]
						fine-medium gravel.
				1.0'	6.0'	Cobbles and boulders, brown fine-medium s

General Borings, Inc.

Sheet ___ of ___

P. O. BOX 7135 PROSPECT, CONNECTICUT 06712

REPORT OF AUGER BORINGS AND PIPE AND BAR PROBINGS

TOWN Bethel LINE

PROJECT NAME Water Transmission Line PROJECT NO.

FOREMAN F.C. C.S. DATE WORK DONE 3/26/7[illegible]

INSPECTOR R.T. FOR Town of Bethel

CONTRACTING ENGINEER

Station	Offset (Ft.) From B L	Offset (Ft.) From C L	Depth Probed (Ft.)	Soil Strata in Auger Holes From (Ft.)	Soil Strata in Auger Holes To (Ft.)	Remarks (Include: Groundwater depth, Size of Auger used, Description of Soil in Auger Holes, Depth of Auger Samples)
A-1 continued				6.0'	15.0'	Brown fine-medium sand, little silt, [illegible] gravel.
			15.0'			Refusal at 15.0', Ground Water Level-[illegible]
B-1				0'	1.5'	Top soil, fine-medium sand and silt, fine-medium gravel.
				1.5'	5.0'	Brown fine-medium sand, trace silt, little fine gravel.
				5.0'	8.5'	Brown fine-medium sand, trace silt, coarse gravel.
			8.5'			Refusal 8.5', Ground Water Level-Dry.
C-3				0'	5.0'	Cobbles and boulders.
			5.0'			Refusal 5.0', Offset 5.0' Northeast. Ground Water Level- Dry
C-3-A	OFFSET 5.0'		Northeast	0'	6.0'	Brown fine-medium sand, some silt, trace coarse gravel.
			6.0'			Refusal 6.0', Ground Water Level-Dry.

THIS DOC

CLIENT Town of Bethel	**General Borings, Inc.** P. O. BOX 7135 PROSPECT CONN 06712	SHEET 1 OF 1	HOLE NO. A-[illegible]
CONTRACTOR GBI #590	PROJECT NAME Water Transmission Line	LINE	
FOREMAN-DRILLER F.C. C.S.	LOCATION Bethel, Conn.	STATION	
INSPECTOR R.T.		OFFSET	

GROUND WATER OBSERVATIONS
AT Dry FT. AFTER 0 HOURS
AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	[illegible]	AX
SIZE I.D.	[illegible]	1 3/8"	[illegible]
HAMMER WT.		[illegible] LB.	
HAMMER FALL		[illegible]	

DATE Start 3/25 Finish [illegible]
SURFACE ELEV. ______
GROUND WATER ELEV. ______

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL, REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	4"	1.5'	1	1	8		moist loose	.08'	Topsoil. 1) Black-brown fine-medium [illegible] and silt, trace fine-medium gravel.
												4.5'	
5												5.0'	NOTE: Cobbles and boulders.
										4.0			
										10.0			
		1	CB	36"	17"	8.0'	(Cored boulder)			4.0		8.0'	Cored Boulder 5.0'-8.0'. Recovered 17".
		2	ss	18"	16"	11.5'	14	25	38		moist very dense		NOTE: Offset Hole 5.0' North because of boulder. 2) Brown fine-medium sand, fine-medium gravel, little [illegible]
15		3	ss	11"	9"	15.92	16	100/5"			moist very dense	15.92	3) Same as sample #2.
										4.0		Run #1	
										3.0			
										4.0			
		1	C	60"	36"	20.92				5.0		20.92	Run #1 Cored [illegible] Recovered 36" [illegible]
										7.0		Run #2	
										7.0			
										7.0			
		2	C	43"	24"	24.58				6.0		[illegible]	Run #2 Cored [illegible] Recovered [illegible]
25												EOB	
													NOTE: [illegible] hole went to [illegible]
													[illegible] BORING [illegible]
													[illegible] Soil
													11.66' Rock
35													

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING

[illegible]

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF

HOLE NO. A-3

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

FOREMAN-DRILLER F.C., C.S.

LOCATION Bethel, Conn.

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT Dry FT. AFTER 0 HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	SS	AX
SIZE I.D.	2 1/2"	1 3/8"	1 1/8"
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		30"	Carbide

DATE Start 3/25

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV	FIELD IDENTIFICATION OF SOIL, REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	SS	18"	6"	1.5'	2	3	9		moist	.08'	Topsoil.
											medium	1.5'	1) Brown fine-medium sand
										9.0		2.5'	silt, trace fine-medium
										7.0		Run	NOTE: First attempt
5										6.0		#1	Offset 4.0' North, refusal
										7.0			
		1	C	60"	39"	7.5'				7.0		7.5'	Run #1 Cored Rock 2.5'-7.5'
												EOB	Recovered 39" Hornblende
10													
15													
20													
25													
30													
35													

END OF BORING 7.5'
2.5' Soil
5.0' Rock

TYPE OF SAMPLES: D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE

EARTH BORING 2.5'

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF [illegible]
HOLE NO. A-[illegible]

CONTRACTOR GBI #590

FOREMAN-DRILLER F.C. C.[illegible]

INSPECTOR R.T.

PROJECT NAME: Water Transmission Line

LOCATION: Bethel, Conn.

LINE

STATION

OFFSET

GROUND WATER OBSERVATIONS

AT 10.17 FT. AFTER 0 HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	[illegible]	AX
SIZE I.D.	2 1/2"	1 3/8"	1 1/8"
HAMMER WT.		140 LBS	BIT
HAMMER FALL		30"	Diamond

	START	FINISH
DATE	3/24	3/24/7[illegible]

SURFACE ELEV. ______

GROUND WATER ELEV. ______

CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
	1	ss	18"	6"	1.5'	1	1	1		moist very loose	2.0'	1) Brown fine-medium sand, [illegible] silt, trace gravel.
	2	ss	18"	9"	6.5'	16	14	12		moist medium		2) Brown fine-medium sand, [illegible] silt, trace fine-medium grave[illegible]
	3	ss	18"	18"	11.5	70	72	140		wet very dense	12.5'	3) Brown fine-coarse sand a[illegible] fine-medium gravel, little si[illegible]
									10.0			
									14.0		Run	
									11.0		#1	
									14.0			
	1	C	60"	58"	17.5'				21.0		17.5'	Run #1 Cored Rock 12.5'-17.5' Recovered 58" Quartz & Gneiss
									3		Run	
									2			
									2			
	2	C	48"	21"	21.5'				3		21.5' EOB	Run #2 Cored Rock 17.5'-21.[illegible] Recovered 21" Quartz & Gneiss

NOTE: Changed to new bit at [illegible]

END OF BORING [illegible]1.5'
12.5' Soil
[illegible].0' Rock

NOTE: Cored to elevation [illegible]

TYPE OF SAMPLES
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING ______ B-37

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF 1
HOLE NO. A 2/3

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

FOREMAN-DRILLER F.C. C.S.

LOCATION Bethel, Conn.

STATION

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS
AT Dry FT. AFTER 0 HOURS
AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA	SS	
SIZE I.D.	2"	1 3/8"	
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		30	

DATE Start 4/1 Finish 4/1/7

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	6"	1.5'	1	3	3		moist loose	1.5'	1) Brown silt and fine-medium sand, trace roots.
												4.0'	NOTE: 1.5'-4.0' Cobbles or boulder.
												EOB	Refusal at 4.0'.
													END OF BORING 4.0' Soil

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

B-38

TOTAL FOOTAGE
EARTH BORING

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF [illegible]

HOLE NO. A-3[illegible]

CONTRACTOR: GBI #500

PROJECT NAME: Water Transmission Line

LINE

FOREMAN-DRILLER: F.C. C.S.

LOCATION: Bethel, Conn.

STATION

INSPECTOR: R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT Dry FT. AFTER 0 HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA		
SIZE I.D.	2"	1 3/8"	
HAMMER WT.		[illegible]	
HAMMER FALL			

DATE: Start 4/1 Finish 4/2

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	5"	1.5'	1	5	5		moist medium	1.5'	[illegible] Black-brown fine-me[illegible] some silt, trace roots.
													NOTE: 1.5'-4.[illegible] [illegible]
												4.5'	boulders.
5												EOB	Refusal at 4.5'.
													END OF BORING 4.5' [illegible]
10													
15													
20													
25													
30													
35													

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE

EARTH BORING B-3[illegible]

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

CLIENT: Town of Bethel

SHEET 1 OF [illegible]

HOLE NO. A-5

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

LINE

FOREMAN-DRILLER F.C. C.S.

LOCATION Bethel, Conn.

STATION

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT 4.5 FT. AFTER 0 HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA	SS	AX
SIZE I.D.	2"	1 3/8"	1 1/8"
HAMMER WT.		[illegible] LB.	BIT
HAMMER FALL			[illegible]

DATE Start 3/21 Finish [illegible]

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	7"	2.0'	3	7	3	3	moist loose		1) Brown fine-medium sand, fine-medium gravel, little [illegible] trace vegetation.
		2	ss	24"	18"	4.0'	10	19	27	28	moist very dense		2) Brown fine-coarse sand, [illegible] silt, trace fine-medium gravel.
5		3	ss	24"	12"	6.0'	12	13	13	16	wet medium		3) Same as sample #2.
		4	ss	24"	18"	8.0'	11	11	8	9	"	8.0'	4) Brown fine-medium sand, [illegible] silt, trace fine-medium gravel.
10		5	ss	24"	12"	10.0'	8	9	11	9	"		5) Same as sample #4.
		6	ss	18"	12"	12.0'	25	43	29	28	wet very dense		6) Brown fine-coarse sand, [illegible] gravel, trace silt.
		7	ss	24"	18"	14.0'	13	30	27	29	"		7) Same as sample #6.
15		8	ss	18"	18"	15.5'	30	64	100		"	16.5'	8) Same as sample #6.
										15.0		Run #1	
										12.0			
										10.0			
20										13.0			
		1	C	60"	26"	21.5'				13.0		21.5' EOB	Run #1 Cored Rock 16.5'-21.5' Received 26" Quartz & Gneiss.
25													
30													
35													
40													

FT. OF BORING 21.5'
16.5' Soil
5.0' Rock

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING ____[illegible]

General Borings, Inc.

P. O BOX 7135 PROSPECT, CONN 06712

CLIENT: Town of Bethel		SHEET 1 OF 1	HOLE NO. A[illegible]-2
CONTRACTOR: GBI #590	PROJECT NAME: Water Transmission Line	NE	
FOREMAN-DRILLER: F.C. C.S.	LOCATION: Bethel, Conn.	STATION	
INSPECTOR: R.T.		OFFSET	

GROUND WATER OBSERVATIONS

AT Dry FT. AFTER 0 HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	[illegible]	
SIZE I.D.	2"	1 3/8"	
HAMMER WT.		140 LBS.	B
HAMMER FALL			

	Start	Finish
DATE	4/2	[illegible]

SURFACE ELEV. ______

GROUND WATER ELEV. ______

CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
	1	ss	18"	6"	1.5'	3	4	5		moist	1.5'	[illegible] brown silt and fine sand,
										loose		trace roots.
											3.5'	Refusal at 3.5'.
											EOB	
												END OF BORING [illegible]

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

PROPORTIONS USED TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

TOTAL FOOTAGE

EARTH BORING ______

ROCK CORING ______

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

CLIENT: Town of Bethel

SHEET 1 OF 1

HOLE NO.

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

LINE

FOREMAN-DRILLER F.C. C.S.

LOCATION Bethel, Conn.

STATION

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT Dry FT. AFTER 0 HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA		
SIZE I.D.		1 3/8"	
HAMMER WT.		140 LBS	BIT
HAMMER FALL			

DATE Start 3/25 Finish

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	6"	1.5'	2	6	21		moist	.08'	Top Soil
											medium	1.0'	1) Brown fine-medium sand, medium-coarse gravel, little
												4.0'	
												EOB	NOTE: 1.0'-4.0' cobbles and boulder. Refusal 4.0'.
													END OF BORING 4.0'

TYPE OF SAMPLES:

D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE

EARTH BORING

CLIENT: Town of Bethel

General Borings, Inc.
P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF 1
HOLE NO B-3

CONTRACTOR: GBI #590
PROJECT NAME: Water Transmission Line
LINE:

FOREMAN-DRILLER: F.C. C.S.
LOCATION: Bethel, Conn.
STATION:

INSPECTOR: R.T.
OFFSET:

GROUND WATER OBSERVATIONS
AT Dry FT. AFTER 0 HOURS
AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	[illegible]	AX
SIZE I.D.	[illegible]	1 3/8"	1 1/2"
HAMMER WT.		140 LBS	BIT
HAMMER FALL		[illegible]	[illegible]

DATE Start 3/25 Finish [illegible]
SURFACE ELEV.
GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS 0-6	BLOWS 6-12	BLOWS 12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	6"	1.5'	1	1	2		moist	.08'	Top Soil.
											very	2.0'	1) Brown fine-medium sand, [illegible]
											loose		fine-medium gravel, little s[illegible]
5		2	ss	18"	6"	6.5'	13	23	28		moist		2) Brown fine-coarse sand, [illegible]
											very	6.5'	medium-coarse gravel, some [illegible]
											dense		NOTE: Cobbles & Boulder [illegible]
10		3	ss	13"	12"	11.08	37	110	50/1"		"		3) Brown fine-coarse sand an[illegible]
													fine-coarse gravel, little [illegible]
										3.0		12.0'	Refusal on spoon at 11.08'. [illegible]
										2.0		Run	Advanced auger to 12.0'.
										3.0		#1	
15										3.0			
		1	C	60"	25"	17.0'				3.0		17.0'	Run #1 Cored Rock [illegible]-17.0'
												EOB	Recovered 25" Quartz & Gneis[illegible]
20													END OF BORING 17.0'
													12.0' Soil
													5.0' Rock
25													
30													
35													
40													

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING ___ B-4

CLIENT: Town of Bethel

General Borings, Inc.
P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF 1
HOLE NO. B-44

CONTRACTOR: GBI #590
PROJECT NAME: Water Transmission Line
FOREMAN-DRILLER: F.C. C.S.
LOCATION: Bethel, Conn.
INSPECTOR: R.T.
LINE
STATION
OFFSET

GROUND WATER OBSERVATIONS
AT 8 FT. AFTER 0 HOURS
AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	SS	
SIZE I.D.	2 1/4"	1 3/8"	
HAMMER WT.		140 lbs.	BIT
HAMMER FALL		30"	

DATE Start 3/24
SURFACE ELEV.
GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	6"	1.5'	2	3	3		moist loose		1) Brown fine-coarse sand, fine-medium gravel, little
												2.5' / 4.0'	
5		2	ss	18"	6"	6.5'	25	15	25		moist dense		2) Brown fine-coarse sand, medium-fine gravel, little silt. Cobbles and boulders.
10		3	ss	18"	10"	11.5'	28	40	19		moist very dense		3) Same as sample #2.
												13.0' EOB	Refusal on Auger at 13.0'.
15													END OF BORING 13.0'
20													
25													
30													
35													
40													

TYPE OF SAMPLES
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST
PROPORTIONS USED TRACE = 0-10% LITTLE = 10-20% ...

TOTAL FOOTAGE
EARTH BORING ____ B-44
ROCK CORING ____

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF ____

HOLE NO. [illegible]

CONTRACTOR: GBI #590

PROJECT NAME: [illegible] Transmission Line

LINE:

FOREMAN-DRILLER: F.C. C.S.

LOCATION: Bethel, Conn.

STATION:

INSPECTOR: R.T.

OFFSET:

GROUND WATER OBSERVATIONS

AT 3.5 FT. AFTER 0 HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	[illegible]	[illegible]	[illegible]
SIZE I.D.	[illegible]	[illegible]	[illegible]
HAMMER WT.		[illegible] LBS.	[illegible]
HAMMER FALL		[illegible]	[illegible]

	START	FINISH
DATE	[illegible]	[illegible]

SURFACE ELEV. ____

GROUND WATER ELEV. ____

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	6"	1.5'	2	2	3		moist	.5'	Top soil.
											loose	1.5'	1 [illegible] black-brown fine-m[illegible]
												3.5'	some silt, trace [illegible]
										[illegible]	Cobbles		gravel, trace roots.
5											&		NOTE: Cobbles & Boulders [illegible]
											Boulders		Offset Hole 5.[illegible]
													Start Coring 3.5'-[illegible]
												8.5'	and Boulders.
													NOTE: Refusal on Auger at [illegible]
10			ss	0"	0"	10.0'	50/0"					10.0'	
										8.0			
										8.0		Run	
										9.0		#1	
										14.0			
		1	C	60"	33"	15.0'				12.0		15.0'	Run #1 Cored Rock [illegible]'-15.
15												EOB	Recovered 33" Quartz & Gnei[illegible]
20													
25													
30													
35													
40													

END OF BORING 15.[illegible]

[illegible]

[illegible]

TYPE OF SAMPLES:

D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON

UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE

EARTH BORING ____

ROCK CORING ____

B-[illegible]

CLIENT: Town of Bethel	**General Borings, Inc.** P. O. BOX 7135 PROSPECT CONN. 06712	SHEET 1 OF 1 HOLE NO. B-4
CONTRACTOR GBI #590	PROJECT NAME Water Transmission Line	LINE
FOREMAN-DRILLER F.C. C.S.	LOCATION Bethel, Conn.	STATION
INSPECTOR R.T.		OFFSET

GROUND WATER OBSERVATIONS
AT Dry FT. AFTER 0 HOURS
AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA	SS	AX
SIZE I.D.			
HAMMER WT.			
HAMMER FALL			

DATE Start 3/24
SURFACE ELEV.
GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	6"	1.5'	3	10	9		moist medium		1) brown fine-coarse sand, some fine-medium gravel, little ... trace roots.
		2	ss	18"	6"	6.5'	16	21	20		moist dense	7.5'	2) Same as sample #1. NOTE: Cobbles and boulders ...
		3	ss	18"	6"	11.5'	26	41	46		moist very dense	12.5'	3) Same as sample #1.
										3 3 2 4 4		Run #1	
		1	C	60"	46"	17.5'						17.5' EOB	Run #1 Cored Rock 12.5'-17.5' Recovered 46" Quartz & ...

END OF BORING 17.5'
12.5' Soil
5.0' Rock

TYPE OF SAMPLES
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

B-4 C

TOTAL FOOTAGE
EARTH BORING ____

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT CONN. 06712

SHEET 1 OF [illegible]

HOLE NO. [illegible]

CONTRACTOR: GBI #590

PROJECT NAME: Water [illegible] ine

FOREMAN-DRILLER: F.C. [illegible]

LOCATION: Bethel, Conn.

STATION:

INSPECTOR: R.T.

OFFSET:

GROUND WATER OBSERVATIONS

AT Dry FT. AFTER 0 HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA	SS	
SIZE I.D.		1 3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

	Start	Finish
DATE	3/26	[illegible]

SURFACE ELEV. ______

GROUND WATER ELEV. ______

CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
	1	ss	18"	6"	1.5'	3	4	5		moist	.67'	Top soil.
										loose		1) brown fine-medium sand, [illegible]
												silt, trace fine-medium [illegible]
												trace roots.
	2	ss	18"	10"	6.5'	7	26	34		moist		2) brown silt and fine-[illegible]
										very		sand, little fine-medium [illegible]
										dense	7.0'	
	3	ss	15"	12"	11.25	32	50	100/3"		"		3) brown fine-coarse sand [illegible]
											11.5'	medium-coarse gravel, trace
											EOB	NOTE: Refusal on Auger at [illegible]
												END OF BORING 11.5' [illegible]

TYPE OF SAMPLES:

D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON

UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE

EARTH BORING B-47

CLIENT Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF [illegible]

HOLE NO. [illegible]

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

FOREMAN-DRILLER L.C. D.R.S.

LOCATION Bethel, Conn.

STATION

INSPECTOR J.S.

OFFSET

GROUND WATER OBSERVATIONS

AT ____ FT. AFTER ____ HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	[illegible]	SS	AX
SIZE I.D.	[illegible]	1 3/8"	1 1/8"
HAMMER WT.		[illegible] LB.	
HAMMER FALL		[illegible]	

DATE Start 4/8 [illegible]

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	8"	2.0'	1	2	6	[illegible]	wet medium		1) Gray-brown fine-medium [illegible] little silt, trace [illegible]
		2	ss	24"	10"	4.0'	10	8	27	29	wet	4.75'	2) Gray medium-fine sand, [illegible] silt. Change in spoon:
5										very	dense		
		3	ss	4"	4"	4.33'	120/4"				" Boulder	7.25'	Brown coarse-fine sand, [illegible] fine gravel, trace silt.
													3) Brown fine-medium gravel, coarse-fine sand, trace [illegible]
			ss	24"	0"	10.0'	11	9	13	16			No recovery at [illegible]
		4	ss	24"	10"	12.0'	11	13	13	60/5"	wet very dense	12.5'	4) Gray-brown fine-medium [illegible] trace fine gravel, trace [illegible]
	3 min. for first foot of rock core									5			
										4.5		Run #1	
										4			
		1	C	60"	12"	17.5'				3			Run #1 Cored Rock [illegible]-17.5'
												17.5' EOB	Recovered 12" Biotite [illegible]
40													NOTE: Water depth 9.[illegible]

END OF BORING 17.5'

10.0' Soil

7.5' Rock

TYPE OF SAMPLES:

D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE

EARTH BORING ____

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT CONN 06712

SHEET 1 OF 1
HOLE NO P-2

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

LINE

FOREMAN-DRILLER L.C. D.R.S.

LOCATION Bethel, Connecticut

STATION

INSPECTOR J.S.

OFFSET

GROUND WATER OBSERVATIONS
AT ______ FT. AFTER ______ HOURS
AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR
TYPE			AX
SIZE I.D.		1 3/8"	1 1/8"
HAMMER WT.		140 LBS	BIT
HAMMER FALL		30"	Diamond

Start DATE 4/8

SURFACE ELEV.

GROUND WATER ELEV.

CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
	1	ss	24"	24"	2.0'	Push/12"			11	wet medium		1) Gray medium-fine sand silt, trace fine gravel.
		"	"	0"	4.0'	7	8	7	9	"	2.0'	No Recovery 2.0'-4.0'.
		"	"	0"	6.0'	3	1	1	1	wet very loose	7.0'	No Recovery 4.0'-6.0'.
	2	"	"	22"	8.0'	1	2	3	10	wet medium		2) Gray medium-fine sand, trace silt, trace fine gravel
	3	"	"	6"	10.0'	6	6	5	7	"		3) Same as Sample #2.
	4	"	12"	1"	11.0'	11/	6"	100/6"		wet very dense	11.0'	4) Coarse gravel in spoon
									4		Run#1	Run#1
									4			Cored rock 11.0'-16.0'.
									3			Recovered 12" Biotite Gneiss
									5			
Run	1	C	60"	12"	16.0'				5		16.0' EOB	

END OF BORING 16.0'

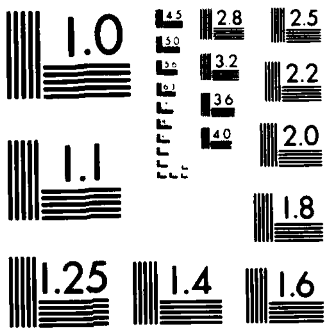
11.0' Soil
5.0' Rock

Note: Depth of water

TYPE OF SAMPLES
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

AD-A142 760 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
EUREKA LAKE DAM (CT 0..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV AUG 79

UNCLASSIFIED F/G 13/13 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF 1
HOLE NO. B-3

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

LINE

FOREMAN-DRILLER L.C. D.R.S.

LOCATION Bethel, Conn.

STATION

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT ______ FT. AFTER ______ HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	FJ	SS	AX
SIZE I.D.	[illegible]	1 3/8"	1 1/8"
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		[illegible]	Diamond

DATE Start 4/4 Finish [illegible]

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	3"	2.0'	7	2	2	2	wet	1.0'	1) Black-gray fine-medium san
										very	loose		some silt, little fine grave
													Brown-gray fine-coarse sand,
		2	ss	24"	10"	4.0'	3	3	8	26	wet		some silt, some fine-medium
5											medium		gravel.
		3	ss	24"	6"	6.0'	24	14	17	18	wet		2) Brown fine-coarse sand, s
											dense		silt, some fine-medium grave
		4	ss	24"	8"	8.0'	9	7	18	8	wet		3) Same as sample #2.
											medium		4) Same as sample #2.
10			ss	24"	0"	10.0'	3	2	4	3	wet		No recovery at 10.0'.
											loose		
		5	ss	24"	8"	12.0'	1	2	4	13	wet	12.0'	5) Brown-gray fine-coarse sa
											medium		little fine-medium gravel, s
		6	ss	24"	24"	14.0'	7	17	21	13	wet		silt.
15											dense		6) Gray fine-coarse sand, so
		7	ss	24"	9"	16.0'	6	19	23	13	"		silt, little fine-coarse gra
													7) Gray fine-coarse sand, so
		8	ss	24"	24"	18.0'	8	9	15	21	"		silt, little fine-medium gra
													8) Gray fine-coarse sand and
20		9	ss	24"	14"	20.0'	45	57	47	60	wet		fine-medium gravel, little s
										very	dense		9) Gray fine-coarse sand and
		10	ss	21"	12"	21.75'	45	60	80	100/3"	"	22.0'	fine-coarse gravel.
										3			10) Gray fine-coarse sand, s
										4		Run	gravel, some silt.
25										4		#1	NOTE: Refusal on casing at 2
										5			
		1	C	60"	44"	27.0'				6		27.0'	Run #1 Cored Rock 22.0'-27.
												EOB	Recovered 44" Gray Gneiss,
													White Quartz.
30													
													NOTE: Depth of Water 5.25'
35													
													END OF BORING 27.0'
													22.0' Soil
													5.0' Rock
40													

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING ____ B-3
ROCK BORING

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF 1

HOLE NO. B-4

CONTRACTOR

FOREMAN-DRILLER L.C. D.R.T.

INSPECTOR J.S.

PROJECT NAME Water Transmission Line

LOCATION Bethel, Conn.

LINE

STATION

OFFSET

GROUND WATER OBSERVATIONS

AT ____ FT. AFTER ____ HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	FC	SS	NX
SIZE I.D.	3"	1 3/8"	2 1/8"
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		30"	Diamond

DATE Start 4/7 Finish 4/7/78

SURFACE ELEV.

GROUND WATER ELEV

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	6"	2.0'	4	10	9	10	wet medium	2.0'	1) Gray-black coarse-fine sand, little silt, trace fine gravel
		2	ss	24"	15"	4.0'	15	15	25	20	wet dense		2) Same as sample #1.
		3	ss	21"	4"	5.75'	23	13	21	100/3"	wet	6.25'	3) Same as sample #1.
										7.5	very	Run #1	
		1	C	24"	22"	8.25'				10.0	dense	8.25'	Run #1 Cored Rock 6.25'-8.25'
										8.0		Run #2	Recovered 22" Biotite Gneiss.
		2	C	24"	24"	10.25'				7.0		10.25'	Run #2 Cored Rock 8.25'-10.25'
		3	C	12"	11"	11.25'				12.0		Run #3	Recovered 24" Same as Run #1.
												11.25'	Run #3 Cored Rock 10.25'-11.25'
												EOB	Recovered 11" Same as Run #1.

END OF BORING 11.25'
6.25' Soil
5.0' Rock

NOTE: Depth of Water 16.8'

TYPE OF SAMPLES
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING ____ B-51

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT CONN. 06712

SHEET 1

HOLE NO. [illegible]

CONTRACTOR: [illegible]

PROJECT NAME: Water Transmission Line

FOREMAN DRILLER: [illegible]

LOCATION: Bethel, Conn.

LINE

STATION

INSPECTOR: [illegible]

OFFSET

GROUND WATER OBSERVATIONS

AT ______ FT. AFTER ______ HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HW	[illegible]	NX
SIZE I.D.	4"	[illegible]	[illegible]
HAMMER WT.		[illegible] LBS.	BIT
HAMMER FALL		[illegible]	[illegible]

	START	FINISH
DATE	3/31	[illegible]

SURFACE ELEV. ______

GROUND WATER ELEV. ______

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.
		1	ss	24"	8"	2.0'	2	7	7	4	moist medium	.5'
		2	ss	24"	5"	4.0'	2	5	8	3	"	
5		3	ss	24"	10"	6.0'	1	1	1	1	wet very loose	
			UP	24"	0"	8.0'	PRESS					
10		4	ss	24"	10"	10.0'	6	1	2	1	wet very loose	
		5	ss	24"	5"	12.0'	2	2	2	2	wet loose	
		6	ss	24"	16"	14.0'	2	1	1	6	wet loose	14.0'
15		7	ss	24"	3"	16.0'	12	20	20	8	wet medium	Cobbles & Boulders
		8	ss	24"	6"	18.0'	11	8	8	5	"	
20		9	ss	24"	10"	20.0'	18	20	15	14	"	
			ss	24"	0"	[illegible]	6	5	6	6	"	
		10	ss	24"	9"	24.0'	6	5	10	26	wet dense	
25		11	ss	24"	16"	26.0'	50	51	56	72	wet very dense	
												29.0'
30										3.0		Run #1
										3.0		
										10.0		
										[illegible]		
		1	C	[illegible]	[illegible]	34.0'				[illegible]		34.0'
35										7.0		Run
										9.0		
										8.0		
										12.0		
40		[illegible]	[illegible]	[illegible]	[illegible]	39.0'				21.0		39.0'

FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.

1) Brown fine-coarse sand and silt, trace fine-medium gravel, trace roots.

.5' Brown silt and fine-medium sand.

3) Same as sample #2.

4) Same as sample #2, with roots, trace clay.

Attempted Shelby Sample - No recovery

4) Brown fine-coarse sand and silt, little fine-medium gravel.

5) Same as sample #4.

6) Same as sample #4.

7) Medium-coarse gravel.

8) Brown-gray fine-coarse sand, some silt, some medium-coarse gravel.

NOTE: 14.0' Cobbles and Boulders

9) Gray fine-coarse sand, some silt, little fine-medium gravel.

NOTE: No recovery 22.0'-24.0'

10) Brown-gray fine-medium sand, little silt, some medium-coarse gravel.

11) Gray fine-medium sand, some silt, some fine-medium gravel.

Run #1 Cored Rock 29.0'-34.0' Recovered 27" Gneiss.

Run #2 Cored Rock 34.0'-39.0' Recovered 14" Gneiss.

TYPE OF SAMPLE:

D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON

UB=UNDISTURBED BALL CHECK VT=VANE TEST

PROPORTIONS USED: TRACE 0-10% [illegible]

TOTAL FOOTAGE

EARTH BORING ______ B-52

CLIENT: Town of Bethel	General Borings, Inc. P.O. BOX 7135 PROSPECT, CONN. 06712	SHEET OF HOLE NO.
CONTRACTOR GBI #990	PROJECT NAME Water Transmission Line	LINE
FOREMAN-DRILLER F.C. C.S.	LOCATION Bethel, Conn.	STATION
INSPECTOR R.T.		OFFSET

GROUND WATER OBSERVATIONS

AT 2 FT. AFTER 0 HOURS

AT FT. AFTER HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HW		NX
SIZE I.D.	4"	1 3/8"	
HAMMER WT.		LBS.	BIT
HAMMER FALL			

DATE 3/31

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
										10.0			
										12.0		Run	
										12.0		#3	
										11.0			
45'		3	C	60"	26"	44.0'				12.0		44.0'	Run #3 Cored Rock
												EOB	Recovered 26" quartz
													NOTE: Boring backfilled with
													Sakrete Concrete Mix.
50'													
													END OF BORING No.
													29.0' Soil
													15.0' Rock

TYPE OF SAMPLES
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

PROPORTIONS USED TRACE 0-10%

TOTAL FOOTAGE
EARTH BORING B-53

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF 1

HOLE NO. B-[illegible]

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

FOREMAN-DRILLER F.C. C.S.

LOCATION Bethel, Conn.

LINE

STATION

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT 2.0 FT. AFTER 0 HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HA	SS	AX
SIZE I.D.	2½"	1 3/8"	1 1/8"
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		30"	Diamond

DATE Start 3/28 Finish 3/28

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	6"	2.0'	2	3	6	37	moist	.5'	Top Soil.
										very	dense	1.5'	1) Brown fine-medium sand, l.
		2	ss	24"	2"	4.0'	3	6	3	1	wet		silt, trace fine-medium grav.
										very	loose		trace roots.
5												5.5'	2) Brown fine-medium sand, s.
		3	ss	24"	6"	6.0'	2	1	1	86	wet		medium-coarse gravel, little
										very	dense		3) Brown fine-coarse sand and
		4	ss	24"	8"	8.0'	44	35	40	76	wet	8.0'	coarse-medium gravel, little
										20.0	very		4) Same as sample # .
10										18.0	dense	Run	
										20.0		#1	
										11.0			
		1	C	60"	36"	13.0'				12.0		13.0'	Run #1 Cored Rock 8.0'-13.0'
												EOB	Recovered 36" Quartz & Gneiss
15													(Changed Bit)

END OF BORING 13.0'
8.0' Soil
5.0' Rock

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

PROPORTIONS USED TRACE=0-10% ...

TOTAL FOOTAGE

EARTH BORING ___ B-54

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF 1

HOLE NO. [illegible]

CONTRACTOR GB.#5[illegible]

PROJECT NAME Water Transmission Line

FOREMAN-DRILLER [illegible].C. [illegible].S.

LOCATION Bethel, Conn.

STATION

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT Surface FT. AFTER 0 HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HA	[illegible]	AX
SIZE I.D.	[illegible]	1 3/8"	1 1/8"
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		30"	Diamond

DATE Start 4/[illegible] [illegible]

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	18"	6"	1.5'	7	7	15		wet medium		1) Brown fine-medium sand, silt, little fine-medium gravel
5		2	ss	18"	10"	6.5'	6	7	9		"		2) Same as sample #1.
												6.5'	
10		3	ss	3"	2"	10.25	100/3"				wet very dense	10.25'	3) Brown fine-medium sand, silt, little medium-coarse gravel.
										6.0			NOTE: 6.5'-10.25' Cobbles and Boulders.
										9.0		Run #1	
										12.0			
										24.0			
15		1	C	60"	38"	15.25'				22.0		15.25' EOB	Run #1 Cored Rock 10.25'-15.25' Recovered 38" Gneiss.

INSTALLED 12.0' OF OBSERVATION [illegible]

Backfilled with Sakrete Concrete Mix-1.0' around Observation [illegible]

END OF BORING 15.25'

10.25' Soil

5.0' Rock

TYPE OF SAMPLES:
D-DRY W-WASHED C-CORED A-AUGER UP-UNDISTURBED PISTON
UB-UNDISTURBED BALL CHECK VT-VANE TEST

TOTAL FOOTAGE

EARTH BORING B-55

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

CLIENT: Town of Bethel

SHEET 1 OF 1

HOLE NO. B-6

CONTRACTOR GBI #590

PROJECT NAME Water Transmission Line

LINE

FOREMAN-DRILLER L.C. D.R.S.

LOCATION Bethel, Conn.

STATION

INSPECTOR R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT 2.5 FT. AFTER 24 HOURS

AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	HW	SS	NX
SIZE I.D.	4"	1 3/8"	2 1/8"
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		30"	Diamond

	Start	Finish
DATE	3/28	4/1

SURFACE ELEV. ____

GROUND WATER ELEV. ____

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	6"	2.0'	1	2	1	2	dry		1) Brown silt fine-medium s
											loose		trace fine roots.
		2	ss	24"	3"	4.0'	1	2	1	1	wet		2) Brown fine-medium sand,
											loose		silt.
5													
			ss	24"	0"	6.0'	1	2	1	1	"		NOTE: No recovery 4.0'-6.0'
		3	ss	24"	3"	8.0'	1	2	3	2	"		3) Brown fine-coarse sand,
													little fine-medium gravel,
10		4	ss	24"	3"	10.0'	5	2	1	1	"		silt.
													4) Same as sample #3.
		5	ss	24"	1"	12.0'	4	3	1	2	"		5) One piece coarse gravel.
		6	ss	24"	4"	14.0'	4	2	1	1	"		6) Brown fine-coarse sand and
			ss	17"	0"	15.42'	4	1	6/5"	50/0"		15.42'	fine-medium gravel.
15										4		Run #1	No recovery at 14.0'-15.42'
		1	C	24"	14"	17.42'				7		17.42'	Run #1 Cored Rock 15.42'-17.
										8		Run #2	Recovered 14" Gray-white Gne
										5			and Quartz.
20		2	C	36"	18"	20.42'				5	Run #3	20.42'	Run #2 Cored Rock 17.42'-20.
		3	C	12"	11"	21.42'				6	Run #4	21.42'	Recovered 18" Gray-white Gne
		4	C	7"	6"	22.0'				8		22.0'	and Quartz.
										5			Run #3 Cored Rock 20.42'-21.
										4		Run	Recovered 11" same as Run #
25										9		#5	Run #4 Cored Rock 21.42'-22.
										5			Recovered 6" same as Run #
		5	C	60"	40"	27.0'				8		27.0'	Run #5 Cored Rock 22.0'-27.
										9		Run	Recovered 40" Gray-white Gne
										11		#6	and Quartz.
30		6	C	36"	23"	30.0'				30		30.0'	NOTE: 15.42'-27.0' drill wat
										5			turned brown intermittently
										6		Run	indicating possible mortar
										7		#7	Run #6 Cored Rock 27.0'-30.
										9			Recovered 23" White Quartz,
35		7	C	60"	56"	35.0'				11		35.0'	little gray Gneiss.
												EOB	Run #7 Cored Rock 30.0'-35.
													Recovered 56" Same as Run #6
													NOTE: Used new Bit for Run #
													NOTE: Boring backfilled with
40													Sakrete Concrete Mix.

B-56

TYPE OF SAMPLES:

D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE

EARTH BORING 15.42 FT.

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT, CONN. 06712

SHEET 1 OF ____
HOLE NO. B-[illegible]

CONTRACTOR: GBI #590

FOREMAN-DRILLER: L.C. [illegible].R.S.

INSPECTOR: R.T.

PROJECT NAME: Water Transmission Line

LOCATION: Bethel, Conn.

LINE

STATION

OFFSET

GROUND WATER OBSERVATIONS
AT 8.5 FT. AFTER 24 HOURS
AT ____ FT. AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	FJ	[illegible]	AX
SIZE I.D.	2 1/2"	1 3/8"	1 1/8"
HAMMER WT.		140 LBS.	BIT
HAMMER FALL			Diamond

DATE Start 4/1 Finish 4/[illegible]
SURFACE ELEV.
GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	5"	2.0'	1	2	3	2	dry	1.0'	1) Brown silty topsoil,
											loose		Brown silt and fine-medium
		2	ss	12"	10"	3.0'	16	125			dry	3.0'	2) Brown fine-coarse sand,
										very	dense	Boulder	fine-coarse gravel, little
5		3	ss	6"	5"	4.5'	130				"		3) Gray fine-coarse sand an
		4	ss	6"	6"	5.5'	130				"		gravel, trace silt.
			ss	0"	0"	7.0'	130						4) Gray fine-coarse sand an
													gravel, trace silt.
													NOTE: Ran core bar from 7.0'
10		5	ss	24"	8"	12.0'	16	11	13	17	moist	10.0'	10.0', drilling shows cobbl
											dense		5) Brown fine-coarse sand a
		6	ss	24"	10"	14.0'	10	11	21	16	wet		fine-medium gravel, little
											dense		6)Gray-brown fine-medium sa
		7	ss	24"	16"	16.0'	9	10	12	9	"		some silt, little fine-med
15													gravel.
		8	ss	24"	10"	18.0'	8	14	10	8	wet		7) Brown fine-coarse sand,
											medium		silt, some fine-medium grav
			ss	24"	0"	20.0'	9	10	9	4	"		8) Same as sample #7.
													NOTE: No recovery 18.0'-20.
20		9	ss	24"	18"	22.0'	9	17	41	115	wet	20.5'	9) Brown fine-coarse sand a
										very	dense		gravel, trace silt.
													NOTE: 22.0'-24.0' drilled
													10) Brown fine-coarse sand,
			ss	0"	0"	24.0'	130						little fine-medium gravel,
25		10	ss	6"	4"	25.5'	130				wet		silt.
											very		NOTE: 25.5'-27.0' drilling
											dense	27.0'	brown fine-coarse sand and
										3			gravel, few cobbles.
										4		Run	Run #1 Cored Rock 27.0'-32.0
30										5		#1	Recovered 30" Gray Gneiss,
										5			white Quartz.
		1	C	60"	30"	32.0'				6		32.0'	NOTE: Lost 50% drillwater at
												EOB	5.0'-7.0'. Lost 100% drillw
													7.0'-27.0'.
35													
													END OF BORING 32.0'
													27.0' Soil
													5.0' Rock
													Backfilled with Sakrete Conc
40													Mix

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING

CLIENT: Town of Bethel

General Borings, Inc.

P. O. BOX 7135 PROSPECT CONN. 06712

SHEET 1 OF 1

HOLE NO. B-10

CONTRACTOR: GBI #500

PROJECT NAME: Water Transmission Line

LINE

FOREMAN-DRILLER: L.C. D.R.

LOCATION: Bethel, Conn.

STATION

INSPECTOR: R.T.

OFFSET

GROUND WATER OBSERVATIONS

AT Surface FT. AFTER 0 HOURS

AT ______ FT. AFTER ______ HOURS

	CASING	SAMPLER	CORE BAR.
TYPE	FJ	SS	AXM AX
SIZE I.D.	2½"	1 3/8"	1 1/8" 1
HAMMER WT.		140 LBS.	BIT
HAMMER FALL		30"	Diamond

DATE Start 3/25 End 3/25

SURFACE ELEV.

GROUND WATER ELEV.

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO.	TYPE	PEN	REC.	DEPTH @ BOT.	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	CORING TIME PER FT. (MIN.)	DENSITY OR CONSIST. MOIST	STRATA CHANGE DEPTH ELEV.	FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC.
		1	ss	24"	14"	2.0'	1	1	2	3½	wet	1.5'	1) Gray fine-medium sand, some
											dense	2.0'	silt.
												Cobbles	Brown fine-coarse sand, little
		2	ss	24"	7"	6.0'	4	5	25	16	wet	4.0'	silt, trace fine gravel.
											dense		NOTE: 2.0'-4.0' cobbles.
5		3	ss	24"	13"	8.0'	15	20	18	9	wet		2) Brown fine-coarse sand,
											medium		fine-coarse gravel, little
			ss	24"	0"	10.0'	5	6	5	7	"	8.0'	3) Same as sample #2.
													NOTE: Slipped sample 8.0'-1
10		4	ss	24"	10"	12.0'	8	7	7	8	"		4) Brown fine-coarse sand,
													fine-medium gravel, trace s
		5	ss	24"	2"	14.0'	7	7	6	5	"		5) Brown fine-coarse sand a
													fine-coarse gravel.
		6	ss	24"	18"	16.0'	5	15	36	100	wet		6) Brown fine-coarse sand,
15											very dense	14.5'	fine-medium gravel, trace s
													Brown fine-coarse sand and
													gravel, trace silt.
		7	ss	9"	6"	18.75	60	100/3"			wet		NOTE: 16.0'-18.0' drilled
											very		7) Brown fine-coarse sand a
20			ss	3"	0"	20.25					dense	20.25'	gravel, few cobbles, trace
										12		Run #1	NOTE: 18.75'-20.0' drilled
		1	C	24"	17"	22.25				22		22.25'	20.0'-20.25' refusal on spo
										5		Run #2	no recovery.
										6			Run #1 Cored Rock 20.25'-22
25		2	C	36"	14"	25.25				6.5		25.25'	Recovered 17" White-gray Ho
												EOB	blende Gneiss.
													Run #2 Cored Rock 22.25'-2
													Recovered 14" Same as Run #
													END OF BORING 25.25'
30													20.25' Soil
													5.0' Rock
35													
40													

TYPE OF SAMPLES:
D=DRY W=WASHED C=CORED A=AUGER UP=UNDISTURBED PISTON
UB=UNDISTURBED BALL CHECK VT=VANE TEST

TOTAL FOOTAGE
EARTH BORING B-58

Cahn Engineers Inc.
CONSULTING ENGINEERS-COMMUNITY DEVELOPMENT CONSULTANTS

March 28, 1977

WATER RESOURCES
UNIT
RECEIVED
MAR 30 1977
ANSWERED
REFERRED
FILED

Mr. Victor F. Galgowski
Superintendent of Dam Maintenance
Water Resources Unit
Department of Environmental
Protection
State Office Building
Hartford, Connecticut 06115

Re: Eureka Lake Dam - Danbury
(CE #14 426 AD)

Dear Mr. Galgowski:

Reference is made to your letter of March 21, 1977 to Mr. Francis J. Clarke, First Selectman of the Town of Bethel regarding the construction adjacent to the dam at Eureka Lake.

As this firm is the consulting engineer for the Town, Mr. Clarke forwarded your letter to us for appropriate action.

The project involved at this site is the construction of the Eureka Water Treatment Plant. The project does not include any work (New Construction, Alteration, Repair, Removal) involving the dam itself. We are placing some riprap adjacent to new Raw Water Intake and Pump House which will cover a small portion of the upstream slope of the dam. On this basis, it was our understanding that a dam construction permit was not required.

However, in light of your letter, we have completed the Application and are forwarding it along with two sets of plans and specifications for your review.

Please see note #1 on page SI-1 of the plans and section 427, page S-13 of the Special Conditions regarding the special instructions to the contractor regarding the protection of the dam.

ALEXANDER DRIVE, WALLINGFORD, CONNECTICUT 06492 PHONE (203) 265-6741
ESTABLISHED 1909

Cahn Engineers Inc.

Mr. Victor F. Galgowski
Page 2
March 28, 1977

If you have any questions, please contact me at your convenience.

Very truly yours,

CAHN ENGINEERS, INC.

Edgar B. Vinal, Jr.

Edgar B. Vinal, Jr.
Senior Vice President

EBV/dac

Enclosures

cc: Frank Clarke

DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER AND RELATED RESOURCES
State Office Building
Hartford, Connecticut 06115

APPLICATION FOR CONSTRUCTION PERMIT FOR DAM

Owner Town of Bethel Date March 28, 1977

P.O. Address Bethel Town Hall Tel. No. 203-743-9231

Bethel, Connecticut 06801

Location of structure:

Town Danbury Shown on USGS Quadrangle Bethel

Name of Stream Eureka Lake at 2-1/2 inches south ~~north~~ of Lat. 41°22' 30"

and 8-1/2 inches east ~~west~~ of Long. 70° 30'

Directions for reaching site from nearest village or route intersection:

Intersection Rte. 53 & Rte. 302 - South on Rte. 53 to Reservoir Road/ West on Reservoir Road to Long Ridge Road - South on Long Ridge Rd. 2,000 ft. to driveway on right to Eureka Lake

This is an application for: (New Construction) (Alteration) (Repair) (Removal)
(check one or more of above)
None of the above, see Remarks

This pond is to be used for: ~~Water Supply for Town of Bethel~~

Dimensions of Pond: width 1000 ft. length 2400 ft. area

Maximum depth of water immediately above dam: 20 ft.

Total length of dam: 250'

Length of spillway: 180'

Height of abutments above spillway: 2'

Type of spillway construction: Concrete and Stone

Type of dike construction: Earth Fill

Spillway section will be set on: (Bedrock) (Gravel) (Clay) (Till) (NA)
(check one of above)

Remarks: Project entails the construction of the Eureka Water Treatment Plant which is southeast of the dam - only work on dam is the placement of rip rap on a portion of the upstream slope.

Signed: Edgar B. Vinal Jr.
Edgar B. Vinal, Jr. (owner) Sr. Vice President
Cahn Engineers, Inc. for the Town of Bethel

Name of Engineer, if any: Cahn Engineers, Inc.
Wallingford, Conn. 06492
(203) 265-6741

APPENDIX C

DETAIL PHOTOGRAPHS

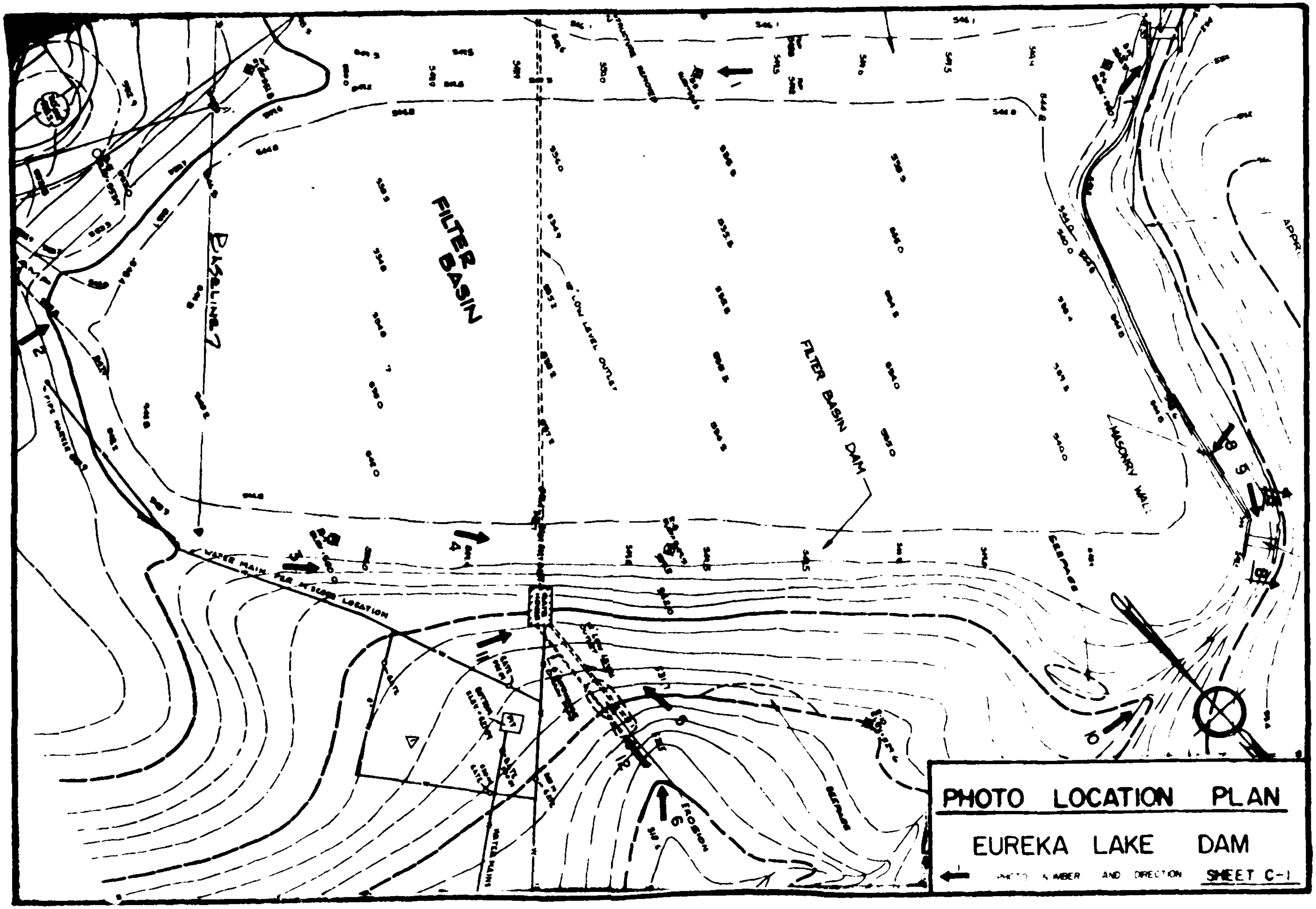
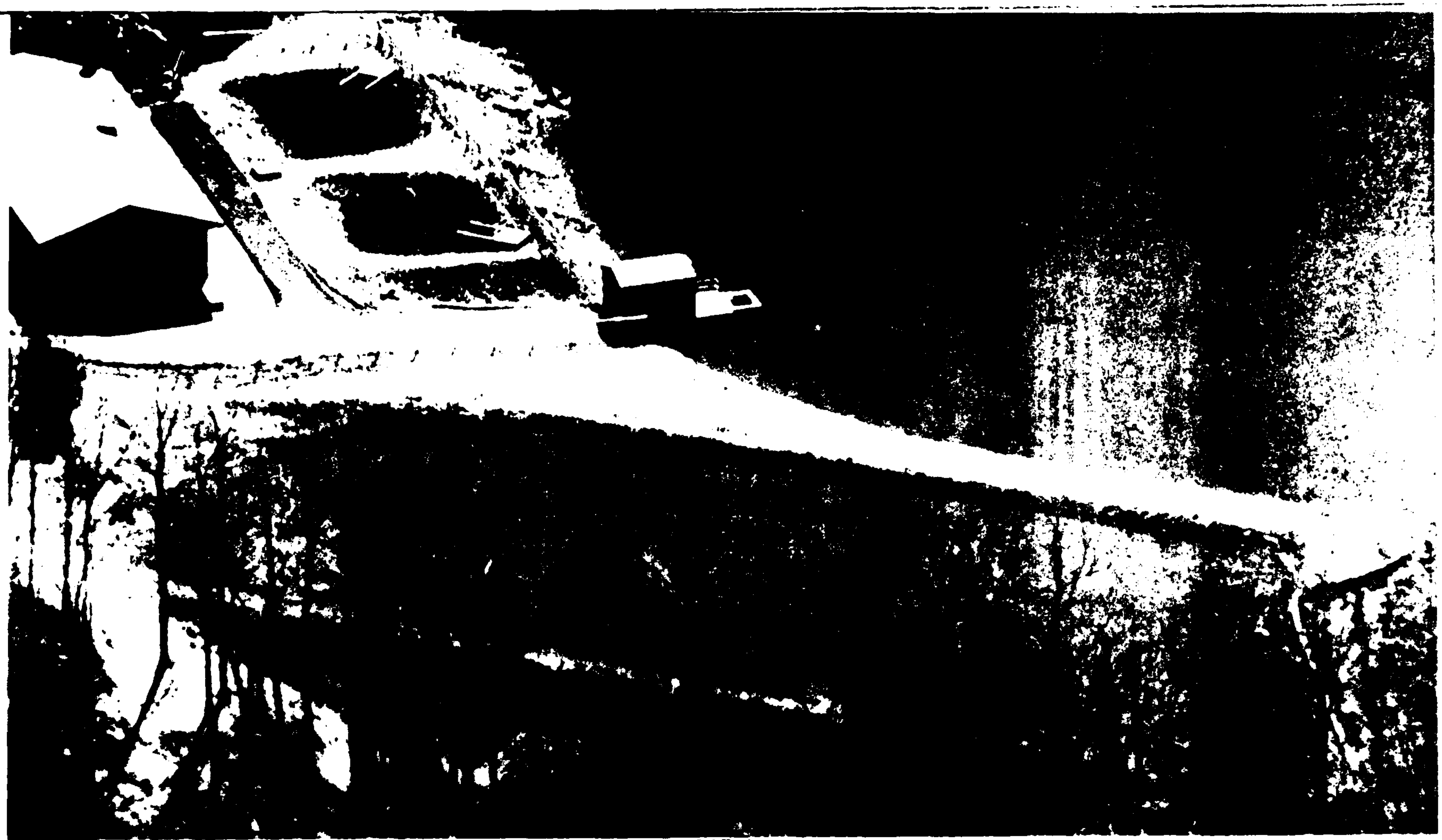


PHOTO LOCATION PLAN
EUREKA LAKE DAM
PHOTO NUMBER AND DIRECTION
SHEET C-1
FILTER BASIN
FILTER BASIN DAM
MASONRY WALL
BASELINE 7
12" LOW LEVEL OUTLET
WATER MAIN PER AS BUILD LOCATION
SEEPAGE
EROSION
WATER MAINS



(March 1979)

US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF	EUREKA LAKE DAM
ENGINEERS INC.	INSPECTION OF NON-FED DAMS	TR-SYMPAUG BROOK

Photo 1 - Crest and upstream slope of reservoir dam from left end (May 1979)

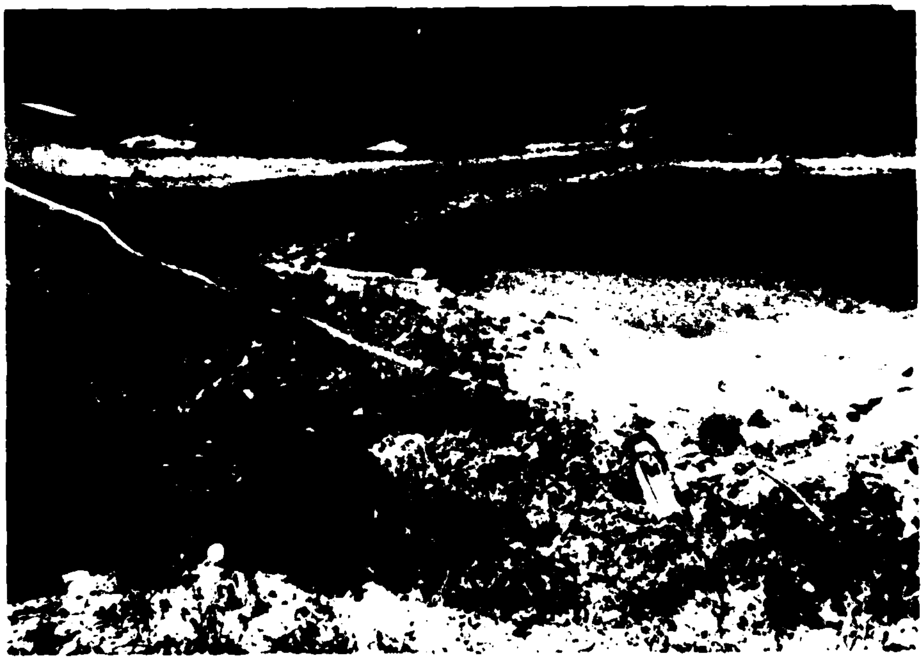


Photo 2 - Crest and downstream slope of reservoir dam from right abutment (August 1979)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EUREKA LAKE DAM SYMPAUG BROOK DANBURY CONNECTICUT CE # 27 660 KB DATE Aug 79 PAGE C-1
CAHN ENGINEERS INC. WALLINGFORD, CONN ENGINEER		

Photo 3 - Crest and downstream slope of filter basin dam from right abutment (May 1979)

Photo 4 - Upstream slope of filter basin dam from right end (July 1979)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EUREKA LAKE DAM TR. SYMPAUG BROOK DANBURY, CONNECTICUT
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER		CE # 27 660 KB DATE Aug 79 PAGE C-2

Photo 5 - Downstream slope of filter basin dam (July 1979)

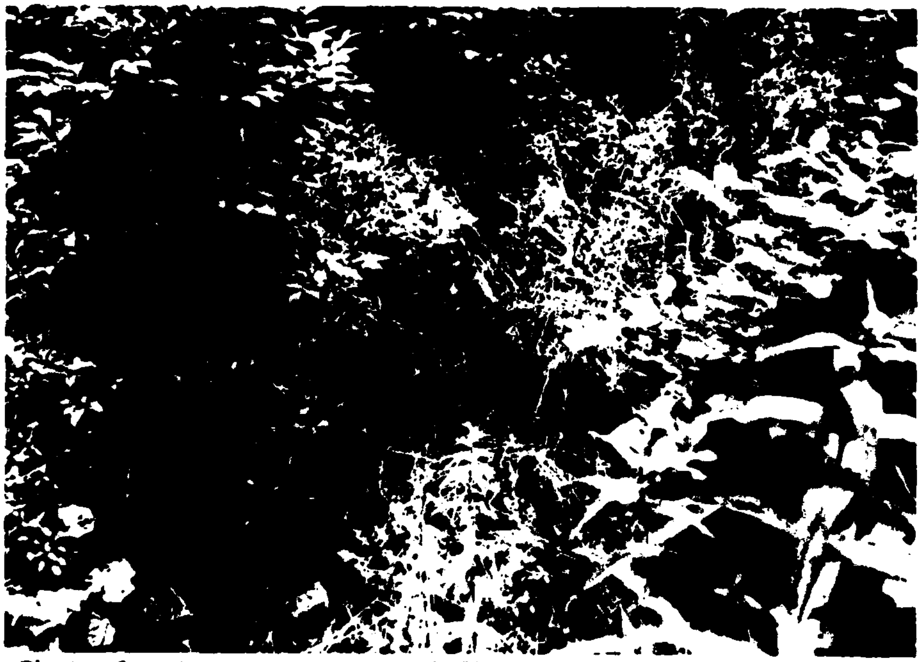


Photo 6 - Downstream toe of filter basin dam. Stream and wet area from outlet pipes (July 1979)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EUREKA LAKE DAM TR. SYMPAUG BROOK DANBURY, CONNECTICUT
CAHN ENGINEERS INC. WALLINGFORD, CONN. ENGINEER		CE # 27 660 KB DATE Aug 79 PAGE C-3

Photo 7 - Upper spillway weir with stop-planks and spillway channel (May 1979)

Photo 8 - Masonry training wall of spillway channel from upstream. Note large crack at base of wall (August 1979)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EUREKA LAKE DAM TR. [illegible]YMPAUG BROOK DANBURY CONNECTICUT CE # [illegible] KB DATE Aug [illegible] PAGE [illegible]
CAHN ENGINEERS INC. WALLINGFORD, CONN ENGINEER		

Photo 9 - Lower spillway weir and spillway [illegible] from upstream
Note wash-out at right side of [illegible] weir (May 197[illegible])

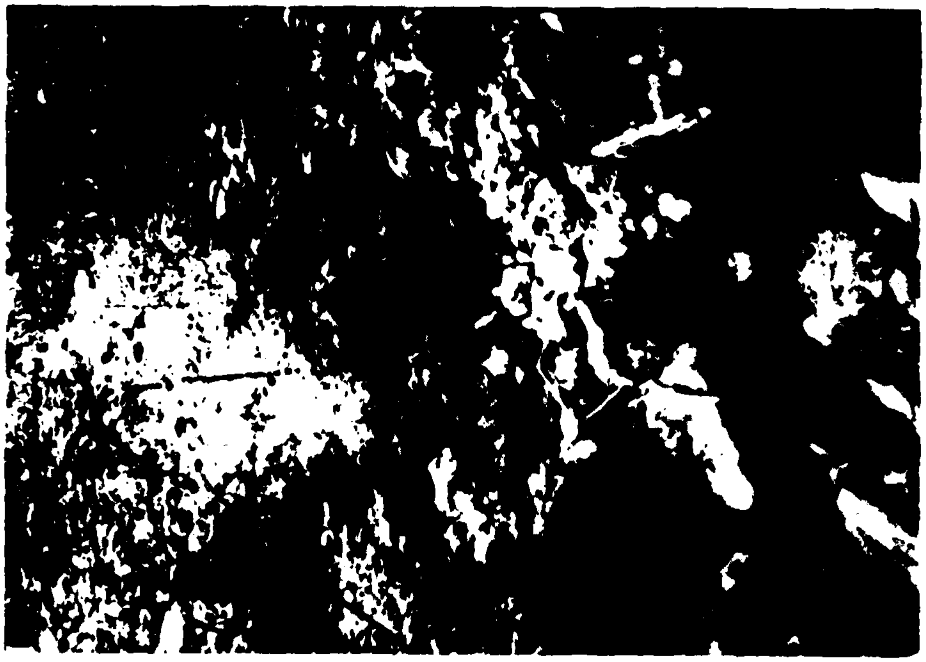


Photo 10- Spillway discharge channel downstream from lower weir (July 197[illegible])

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS	NATIONAL PROG[illegible] OF INSPECTION OF NON-FED. DAMS	[illegible]EKA LAKE DAM [illegible] RIVER [illegible] CONNECTI[illegible] CE # [illegible] DATE [illegible] PAGE
CAHN ENGINEERS INC. WALLINGFORD, CONN ENGINEER		

Photo 11 - Gatehouse on downstream slope of filter basin dam (July 1979)

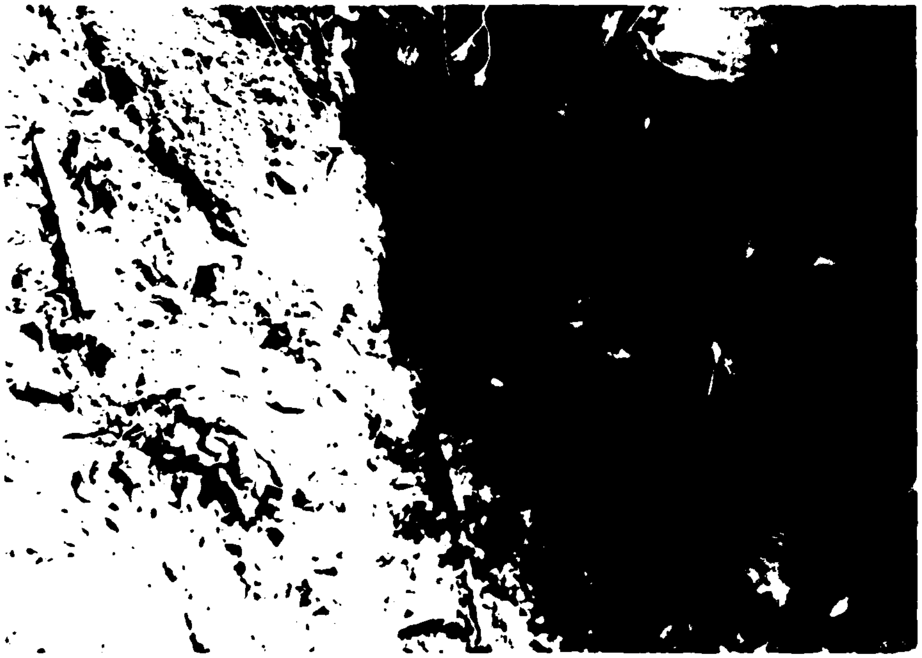


Photo 12 - 12 inch low level outlet (right) and 6 inch gatehouse drain pipe (left) Note extensive erosion in this area. (May 1979)

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	EUREKA LAKE DAM TR. SYMPAUG BROOK DANBURY CONNECTICUT
CAHN ENGINEERS INC. WALLINGFORD, CONN ENGINEER		CE # [illegible] DATE [illegible] PAGE [illegible]

APPENDIX D

HYDRAULICS/HYDROLOGIC COMPUTATIONS

EUREKA LAKE DAM
DRAINAGE AREA 0.5 SQ MI
Long Ridge
OLD LANTERN
USGS QUADRANGLE BETHEL 1970
CAHN ENGINEERS INC.
WALLINGFORD, CONNECTICUT
ENGINEER
U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS
DRAINAGE AREA MAP
EUREKA LAKE DAM
BROOK
DWN BY
CKD BY
APP BY
SCALE 1" = 2000'
DATE AUGUST 1979
SHEET D-1

Cahn Engineers Inc. **Consulting Engineers**

Project N-E Dams Insp. - Eureka Dam
Computed By GAB Checked By [illegible] JK
Field Book Ref / Other Refs /
Sheet 1 of 5
Date 21 Jul 79
Revisions

Hydrologic / Hydraulic Inspection

Eureka Dam, Danbury, Conn

I) Performance at Test Flood Conditions

1) Probable Maximum Flood

a) Watershed Rolling to Mountainous but classified as Rolling to account for minor storage provided by Mountain Pond

b) Watershed area = 310 acres or 0.48 sq. miles

c) Extrapolating from NED-ACE Guide Curves:

$$PMF = 2{,}600 \text{ cfs/sq. mile}$$

d) Therefore Peak Inflow:

$$PMF = (2600)(0.48) \approx 1200 \text{ cfs}$$

2) Spillway Design Flood (SDF)

a) Classification of Dams

i) Size: Storage 250* ac. ft < 1,000 ac. ft
Height:
Reservoir Dam 18'
Filter Dam 20'

*210 to spillway crest

Cahn Engineers Inc. Consulting Engineers

Project N-E Dams Insp. - Eureka Dam Sheet 2 of 5
Computed By GAB Checked By JAC Date 21 Jul 77
Field Book Ref Other Refs Revisions

2a-Cont'd) Classification

ii) Hazard Potential: The dams are located some 1800' upstream of some low houses and about 1 mile upstream of the town of Bethel

iii) Size: Small
Hazard: High

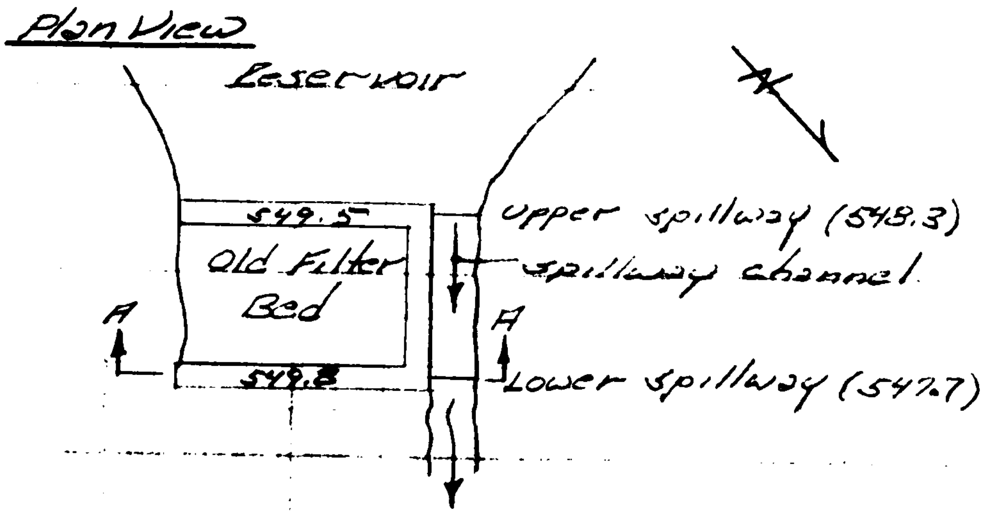
b) $SDF = PMF = 1200$ cfs $\frac{1}{2} PMF = 600$ cfs

3) Surcharge at Peak Inflows

a) Peak Inflows $Q_{p_1} = 1200$ cfs

$Q'_{p_1} = \frac{1}{2} PMF = 600$ cfs

b) Most restrictive outlet (Section A-A)

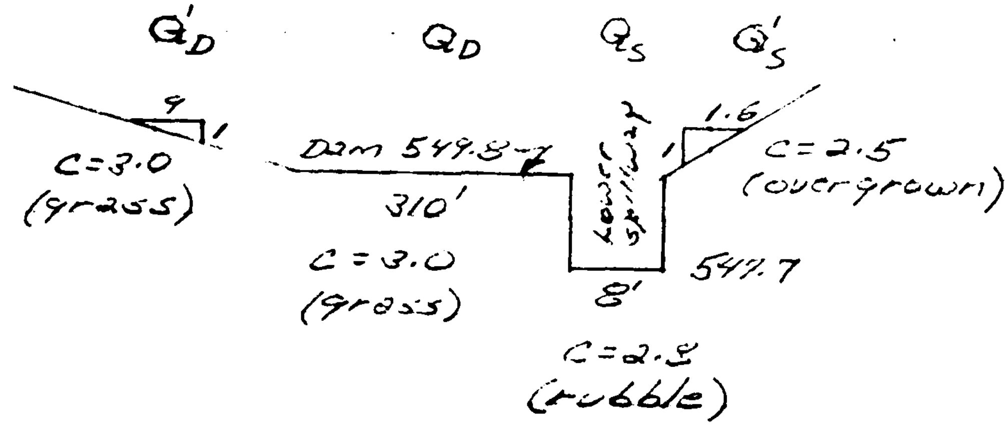


Cahn Engineers Inc. **Consulting Engineers**

Project N-E Dams Insp. - Eureka Dam Sheet 3 of 5
Computed By EAB Checked By JAC Date 21 Jul 77
Field Book Ref Other Refs Revisions

36-Cont'd) Most Restrictive Outlet

Section A-A



$Q_S = (2.8)(8)(H)^{3/2} = 22.4H^{3/2}$

$Q'_S = (2.5)(2/3)(1.6)(H-2.1)(H-2.1)^{3/2} = 2.67(H-2.1)^{5/2}$

$Q_D = (3.0)(310)(H-2.1)^{3/2} = 930(H-2.1)^{3/2}$

$Q'_D = (3.0)(2/3)(9)(H-2.1)(H-2.1)^{3/2} = 18(H-2.1)^{5/2}$

Therefore total outflow can be approximated by the following:

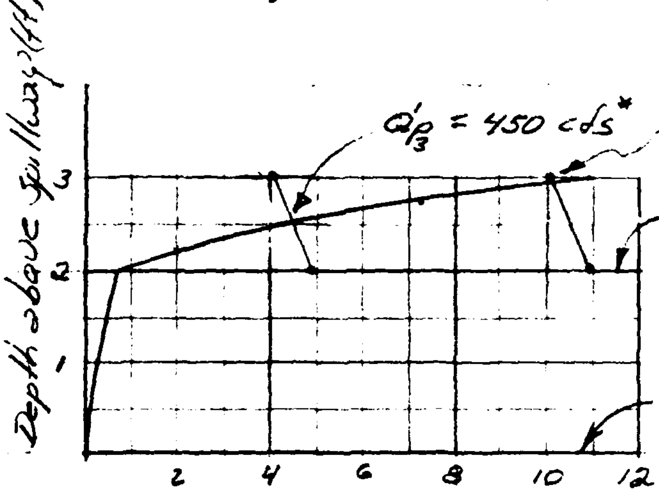
$Q = 22.4H^{3/2} + 2.67(H-2.1)^{5/2} + 930(H-2.1)^{3/2} + 18(H-2.1)^{5/2}$

$Q = 22.4H^{3/2} + 20.7(H-2.1)^{5/2} + 930(H-2.1)^{3/2}$

Cahn Engineers Inc. Consulting Engineers

Project N-E Dams Insp - Eureka Dam
Computed By GAB
Checked By JAC
Field Book Ref.
Other Refs.
Sheet 4 of
Date 21 July
Revisions

3)c) Outflow Rating Curve thru Section A-A



* see sheet 6

d) Surcharge Height to Pass Q_{p_1} (Sec A-A)

@ Q_{p_1} = PMF = 1200 cfs H_1 = 3.1'

@ Q'_{p_1} = ½ PMF = 600 cfs H_1' = 2.7'

e) Spillway Capacity to Top of Dam

Upper: C = 2.8 L = 80' H = 1.2'*
Q_{s_U} = 29 cfs

Lower C = 2.8 L = 7.8' H = 2.1'**
Q_{s_L} = 66 cfs

* To top of reservoir dam

** To top of filter dam

Cahn Engineers Inc.
Consulting Engineers

Project N-E Dams Insp - Eureka Dam
Computed By GAR Checked By JHC
Field Book Ref Other Refs
Sheet 5 of
Date
Revisions

4) Effect of Storage on Discharges (Outflow)

a) Reservoir area 31 acres (USGS)

b) Assume normal pool at elevation of upper spillway - 548.3)

Elevation of lower spillway (sec. A-A) = 547.7 (see sheet 2) therefore storage height = H over lower spillway less 0.6' (548.3 - 547.7)

c) watershed area = 0.48 sq miles (see sheet 1)

d) Discharge, Q_{p_2}, at various surcharge elevations.

H_L = height over lower spillway

$H_L = 3'$ $V = (3-0.6)(31) = 74.4$ ac ft

$S = 74.4/0.48 \times 53.3 = 2.9''$

H_L = 2' $V = (2-0.6)(31) = 43.4$ ac ft.

$S = 43.4/0.48 \times 53.3 = 1.7''$

Cahn Engineers Inc. Consulting Engineers

Project N-E Dam Insp. [illegible] Sheet [illegible] of [illegible]
Computed By [illegible] Checked By JAC Date [illegible]
Field Book Ref Other Refs Revisions

4d. (cont'd) Discharge, Q_{p2}

PMF	½ PMF
$Q_{p2} = Q_{p1}(1 - S/19)$	$Q'_{p2} = Q'_{p1}(1 - S/9.5)$
$Q_{p1} = 1200$ cfs	$Q'_{p1} = 600$ cfs
$H_h = 3$ $Q_{p2} = 1020$ cfs	$Q'_{p2} = 415$ cfs
$H_h = 2$ $Q_{p2} = 1240$ cfs	$Q'_{p2} = 490$ cfs
$Q_{p3} = 1030$ cfs	$Q'_{p3} = 450$ cfs
$H_h = 2.9$	$H_h = 2.6$
Pool elev = 2.9 + 547.7 = 550.6	Pool elev = 2.6 + 547.7 = 550.3
Height over:	Height over:
Reservoir Dam 1.1'	Reservoir Dam 0.8'
Filter Dam 0.8'	Filter Dam 0.5'
Upper spillway 2.3'	Upper spillway 2.0'
Lower spillway 2.9'	Lower spillway 2.6'

Cahn Engineers Inc. Consulting Engineers

Project N-E Dam Insp - [illegible] Dam Sheet 1 of 2
Computed By [illegible] Checked By HW JAC Date [illegible]
Field Book Ref ✓ Other Refs Revisions

II Downstream Failure Hazard

1) Depth of flow in downstream channel before reservoir dam is overtopped

$S = 10\%$
$n = 0.05$

Channel Section 1000' Downstream From Dams (Looking D/S)

Q (upper spillway) = 37 cfs (see sheet 4)

Normal depth = 1.0'

2) Peak flood and stage at immediate impact area (both dams must fail to release reservoir storage) (Use reservoir dam for analysis)

a) Breach Width

i) Mid-Height elevation = 540.5

ii) Approximate mid-height length ≈ 150'

iii) Breach width ≈ .4 × 150 = 60'

Cahn Engineers Inc.

Consulting Engineers

Project N-E Dams Insp - [illegible]
Computed By GAB Checked By [illegible] JAC
Field Book Ref Other Refs
Sheet 8 of [illegible]
Date 23 Jul 77
Revisions

2 b) Peak Failure Outflow (assume surcharge to top of dam)

i) Height at failure - $Y_0 = 18'$

ii) Upper spillway discharge 29cfs (sheet 4)

iii) Breach Outflow (Q_b)

$$Q_b = 8/27\, W_b \sqrt{g}\, Y_0^{3/2} \cong 7{,}700\ \text{cfs}$$

iv) Peak failure outflow =

29 cfs + 7,700 cfs ≈ 7,700 cfs

c) Increase in normal depth due to dam failure (see section shown on sheet 7)

Normal depth for 29 cfs from upper spillway	1.0'
Normal depth for 7,700 cfs	8.1'
Increase in depth due to dam failure	7.1

PRELIMINARY GUIDANCE

FOR ESTIMATING

MAXIMUM PROBABLE DISCHARGES

IN

PHASE I DAM SAFETY

INVESTIGATIONS

New England Division
Corps of Engineers

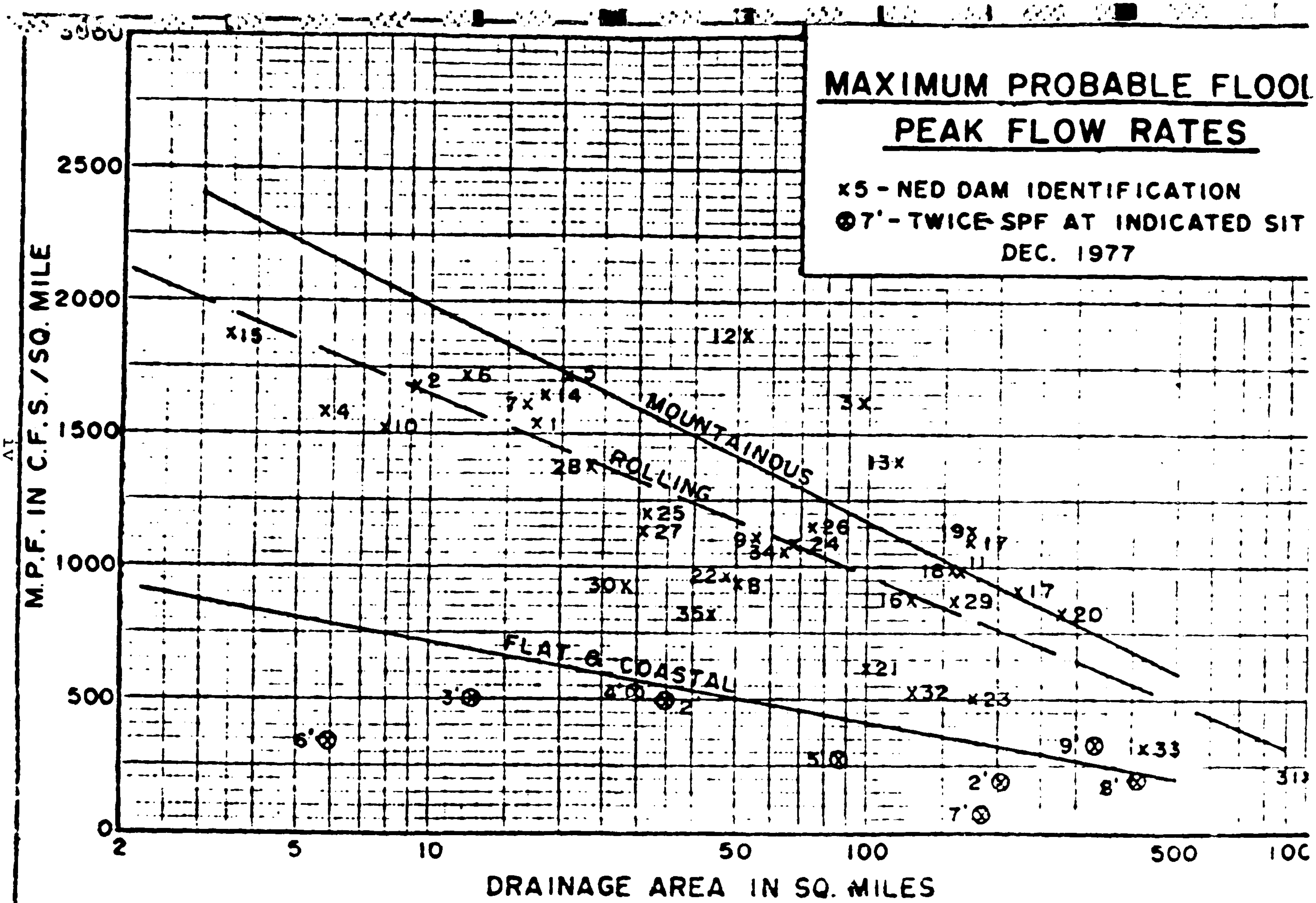
March 1978

MAXIMUM PROBABLE FLOOD INFLOWS
NED RESERVOIRS

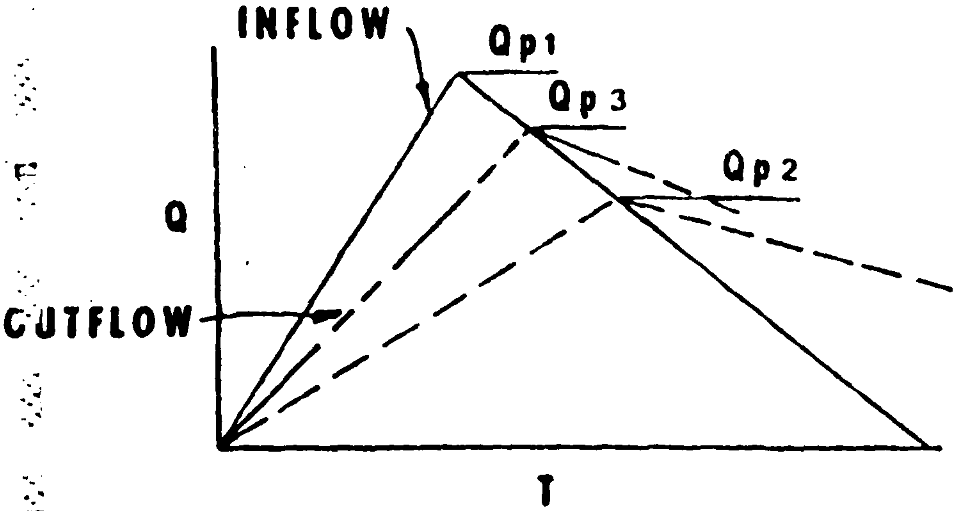
Project	Q (cfs)	D.A. (sq. mi.)	MPF cfs/sq. mi.
1. Hall Meadow Brook	26,600	17.2	1,546
2. East Branch	15,500	9.25	1,675
3. Thomaston	158,000	97.2	1,625
4. Northfield Brook	9,000	5.7	1,580
5. Black Rock	35,000	20.4	1,715
6. Hancock Brook	20,700	12.0	1,725
7. Hop Brook	26,400	16.4	1,610
8. Tully	47,000	50.0	940
9. Barre Falls	61,000	55.0	1,109
10. Conant Brook	11,900	7.8	1,525
11. Knightville	160,000	162.0	987
12. Littleville	98,000	52.3	1,870
13. Colebrook River	165,000	118.0	1,400
14. Mad River	30,000	18.2	1,650
15. Sucker Brook	6,500	3.43	1,895
16. Union Village	110,000	126.0	873
17. North Hartland	199,000	220.0	904
18. North Springfield	157,000	158.0	994
19. Ball Mountain	190,000	172.0	1,105
20. Townshend	228,000	106.0(278 total)	820
21. Surry Mountain	63,000	100.0	630
22. Otter Brook	45,000	47.0	957
23. Birch Hill	88,500	175.0	505
24. East Brimfield	73,900	67.5	1,095
25. Westville	38,400	99.5(32 net)	1,200
26. West Thompson	85,000	173.5(74 net)	1,150
27. Hodges Village	35,600	31.1	1,145
28. Buffumville	36,500	26.5	1,377
29. Mansfield Hollow	125,000	159.0	786
30. West Hill	26,000	28.0	928
31. Franklin Falls	210,000	1000.0	210
32. Blackwater	66,500	128.0	520
33. Hopkinton	135,000	426.0	316
34. Everett	68,000	64.0	1,062
35. MacDowell	36,300	44.0	825

MAXIMUM PROBABLE FLOWS BASED ON TWICE THE STANDARD PROJECT FLOOD (Flat and Coastal Areas)

	River	SPF (cfs)	D.A. (sq. mi.)	MPF (cfs/sq. mi.)
1.	Pawtuxet River	19,000	200	190
2.	Mill River (R.I.)	8,500	34	500
3.	Peters River (R.I.)	3,200	13	490
4.	Kettle Brook	8,000	30	530
5.	Sudbury River.	11,700	86	270
6.	Indian Brook (Hopk.)	1,000	5.9	340
7.	Charles River.	6,000	184	65
8.	Blackstone River.	43,000	416	200
9.	Quinebaug River	55,000	331	330


MAXIMUM PROBABLE FLOOI
PEAK FLOW RATES
x5 - NED DAM IDENTIFICATION
⊗7' - TWICE SPF AT INDICATED SIT
DEC. 1977
MOUNTAINOUS
ROLLING
FLAT & COASTAL
M.P.F. IN C.F.S. / SQ. MILE
DRAINAGE AREA IN SQ. MILES
3000
2500
2000
1500
1000
500
0
2
5
10
50
100
500
100

ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



STEP 1: Determine Peak Inflow (Q_{p1}) from Guide Curves.

STEP 2: a. Determine Surcharge Height To Pass "Q_{p1}".

b. Determine Volume of Surcharge ($STOR_1$) In Inches of Runoff.

c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefore

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR_1}{19}\right)$$

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Q_{p2}"

b. Average "$STOR_1$" and "$STOR_2$" and Determine Average Surcharge and Resulting Peak Outflow "Q_{p3}".

SURCHARGE STORAGE ROUTING SUPPLEMENT

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Avg "$STOR_1$" and "$STOR_2$" and Compute "Qp_3".

c. If Surcharge Height for Qp_3 and "$STOR_{AVG}$" agree O.K. If Not:

STEP 4: a. Determine Surcharge Height and "$STOR_3$" To Pass "Qp_3"

b. Avg. "Old $STOR_{AVG}$" and "$STOR_3$" and Compute "Qp_4"

c. Surcharge Height for Qp_4 and "New $STOR_{Avg}$" should Agree closely

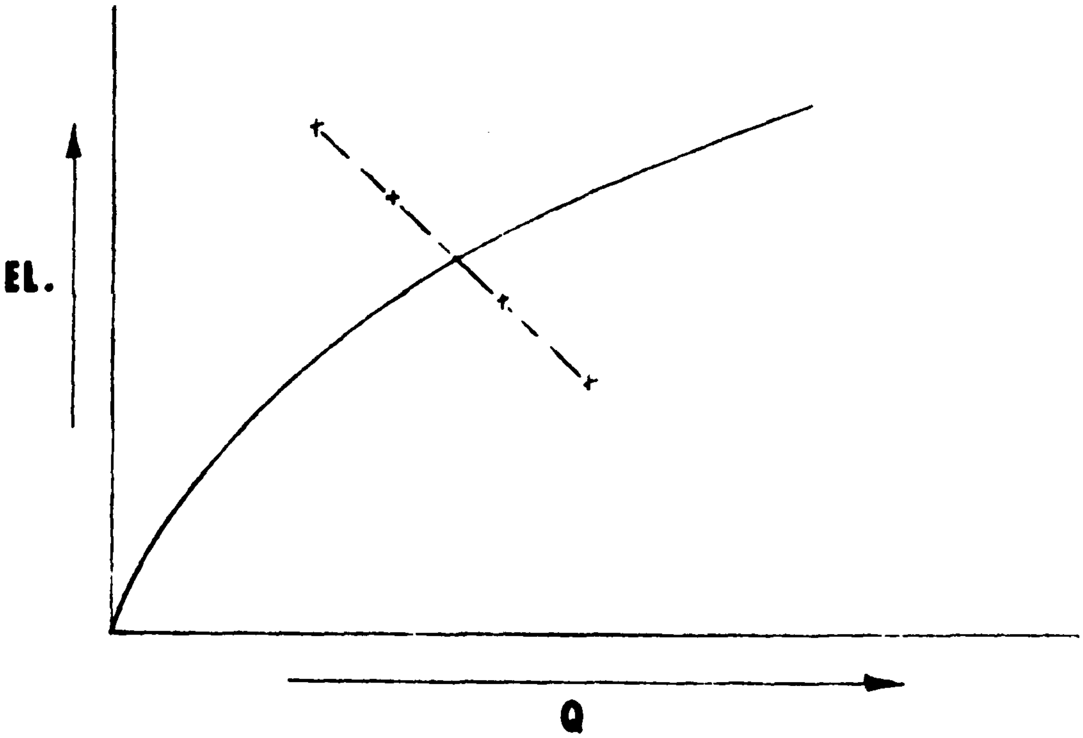
SURCHARGE STORAGE ROUTING ALTERNATE

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR}{19}\right)$$

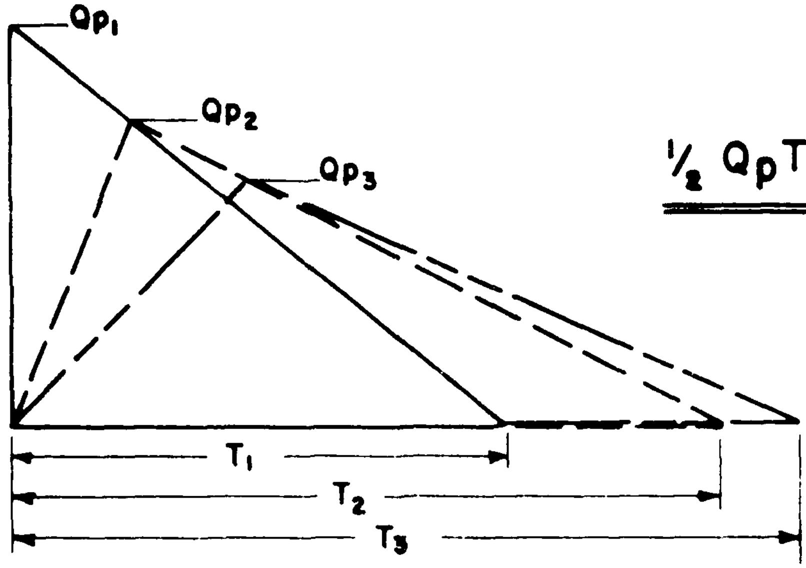
$$Q_{p2} = Q_{p1} - Q_{p1}\left(\frac{STOR}{19}\right)$$

FOR KNOWN Q_{p1} AND 19'' R.O.

Q_{p2}	STOR	EL.



"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



$\frac{1}{2} Q_p T = 12\,S$

STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Qp_1 = \frac{8}{27} W_b \sqrt{g}\, Y_o^{3/2}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOPMANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2}.

$$Qp_2(\text{TRIAL}) = Qp_1 \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2}.

$$Qp_2 = Qp_1 \left(1 - \frac{V_{ave}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

END

FILMED

8